

**Subject:** Re: [s-w-h] Solar verses wind efficiency  
**From:** David Raine (dave@dyocore.com)  
**To:** wind4energy@yahoo.com;  
**Date:** Thursday, February 10, 2011 9:57 PM

This a great point towards my contention with those that stick to numbers only, all of which is outlined in our blogs very thoroughly. The betz law does not and could not ever reflect real world conditions, I can demonstrate even under the most difficult conditions that direct force/volume never exists in the real world. Anyone can pick up a book and be a self proclaimed genius, but a book does you absolutely no good in the real world. Your math is simply wrong. You are wrong.

David Raine  
760-580-4271

On Feb 10, 2011, at 6:43 PM, Michael Klemen <wind4energy@yahoo.com> wrote:

David,

I appreciate passion for something that is good and responsible!

It is hard to ignore some of the obvious things you mentioned.

"Professionals" don't have to do as you suggest. People with experience such as Mike Bergey do not need to spend a moment in your testing facility or test your turbine to know that what information that is publicly available tells us that the claims are totally impossible. It is physically impossible to capture energy that doesn't exist.

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Do the math. The DyoCore turbine is just over 1 square meter. The installed cost of a turbine to generate 75 cents of electricity per month (15 c/kwh) has got to be cheaper than dirt! I recall

**Exhibit 51**

that you previously claimed that 6 mph was a decent wind site for installing a wind turbine. A single nominal 100 watt solar panel for 4 sun hours/day would yield .4 kWh/day or 12 kWh/month. At \$2/watt, that would be a \$200 investment plus an inverter. That would generate 3 times the energy at 1/8 the cost!

I'm just trying to keep your statements in perspective.

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So, given the physics, what kind of a flying pig is it?  
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**Exhibit 52**

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**From:** David Raine (dave@dyocore.com)  
**To:** wind4energy@yahoo.com;  
**Date:** Thursday, February 10, 2011 11:51 PM

---

You are welcome to visit our facility or test our SolAir at any time.

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760-580-4271

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**Exhibit 53**

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**From:** David Raine (dave@dyocore.com)  
**To:** wind4energy@yahoo.com;  
**Date:** Thursday, February 10, 2011 11:52 PM

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Exhibit 54



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**Date:** Friday, February 11, 2011 6:27 AM

---

David,

On this list, hit Reply All. Remove any recipients you do not want to send to.

While I appreciate the offer to visit your facility, I can save a lot of money simply looking at the data. The data simply does not add up, so a visit would not help with any of these issues.

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But do you also refund installation costs when the turbine doesn't perform as expected? You cannot refund the faith that people had in a product when it disappoints. You cannot refund the faith and hope people had in wind energy when it doesn't deliver. That's why we're asking these questions.

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Nope. Southwest Wind Power has a wind tunnel for research. I bet there are more.

Sincerely,  
Mike Klemen

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subscribe to a daily digest of the list,  
or stop receiving the list by e-mail  
(and read it on the Web), go to  
<http://www.yahoogroups.com/list/small-wind-home> .
- . An FAQ on small wind systems is located at

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---

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**Subject:** RE: [s-w-h] Solar verses wind efficiency  
**From:** Michael Klemen (wind4energy@yahoo.com)  
**To:** dave@dyocore.com;  
**Date:** Saturday, February 12, 2011 7:58 AM

---

David,

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It states: "The difficulty in answering this question is compounded by the difficulty in obtaining accurate data to make energy production assumptions. Below is our attempt to simplify the answer. Though we can almost identify maximum capabilities it is difficult to accurately estimate wind speeds, consistency and conversion capabilities of the equipment being used"

The answer is not difficult. It is not difficult to obtain the necessary data according to the IEC or SWCC standards.

**Exhibit 56**

The process is outlined pretty clearly. There is no need to accurately estimate anything. All you have to do is just measure it.

Further, it states:

"The following table provides a power curve as applied to the Betz law;"

Well, it is clear that whoever wrote this page and whoever took the data doesn't understand the difference between power performance measurement and the guideline provided by Betz. Power Curves are never applied to the Betz law. The resultant power curve can be compared to the Betz law for reasonability.

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From: David Raine <dave@dyocore.com>  
Subject: RE: [s-w-h] Solar verses wind efficiency  
To: "Michael Klemen" <wind4energy@yahoo.com>  
Date: Friday, February 11, 2011, 10:42 AM

Thank you.

David Raine  
DyoCore  
www.dyocore.com  
p&f. 866-404-2428  
c. 760-580-4271  
dave@dyocore.com

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From: Michael Klemen [mailto:wind4energy@yahoo.com]  
Sent: Friday, February 11, 2011 4:28 AM  
To: David Raine  
Subject: Re: [s-w-h] Solar verses wind efficiency

David,

On this list, hit Reply All. Remove any recipients you do not want to send to.

While I appreciate the offer to visit your facility, I can save a lot of money simply looking at the data. The data simply does not add up, so a visit would not help with any of these issues.

Mike

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From: David Raine <dave@dyocore.com>  
Subject: Re: [s-w-h] Solar verses wind efficiency  
To: "Michael Klemen" <wind4energy@yahoo.com>  
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I am responding from my iPad, I simply hit reply.

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Please humor me and post your first reply to the list, or are you afraid to? I'm not afraid of a discussion in public. It will demonstrate how serious you are about wanting to bring your technology to the mainstream. Hiding off the list and talking like this tells me more than anything else of this conversation.

Please demonstrate as you have said you can:

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reflect real world conditions, I can demonstrate even under the most difficult conditions that direct force/volume never exists in the real world. Anyone can pick up a book and be a self proclaimed genius, but a book does you absolutely no good in the real world. Your math is simply wrong. You are wrong.

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"Professionals" don't have to do as you suggest. People with experience such as Mike Bergey do not need to spend a moment in your testing facility or test your turbine to know that what information that is publicly available tells us that the claims are totally impossible. It is physically impossible to capture energy that doesn't exist.

I do note that you haven't talked about what Mike Bergey or myself said about the product. We weren't talking about a sales pitch or feelings.

Testing a wind turbine in a wind tunnel can be useful for a manufacturer, but cannot be used for any type of energy or performance information for public consumption.

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Do the math. The DyoCore turbine is just over 1 square meter. The installed cost of a turbine to generate 75 cents of electricity per month (15 c/kwh) has got to be cheaper than dirt! I recall that you previously claimed that 6 mph was a decent wind site for installing a wind turbine. A single nominal 100 watt solar panel for 4 sun hours/day would yield .4 kWh/day or 12 kWh/month. At \$2/watt, that would be a \$200 investment plus an inverter. That would generate 3 times the energy at 1/8 the cost!

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There just isn't enough energy in the wind at that average

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- > I believe strongly low wind conversion can be
- > accomplished. Maybe not today but very soon. I invite
- > this group to think a bit more about that flying
- > pig.

So, given the physics, what kind of a flying pig is it?  
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(and read it on the Web), go to

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— — — — —

**Subject:** RE: [s-w-h] Solar verses wind efficiency

**From:** David Raine (dave@dyocore.com)

**To:** wind4energy@yahoo.com;

**Date:** Monday, February 14, 2011 4:01 PM

---

Hi Michael, looks like your post was just to me but you are welcome to post this for everyone in your forum.

Yes the "Wind Pit" is a great learning experience for us and for the industry. Not many companies get to actually test their products in a controlled environment.

I can understand your assumptions and initially would have thought the same myself, however, it turns out quite the opposite.

1. Exact volume – Betz's law (60" wind tunnel – 60" blade diameter) will create lower results than could be experienced in the real world. <http://www.symscape.com/blog/virtual-wind-turbine-breaks-betz-law>
2. Betz's law is the basis for most turbine power curves
3. Our tunnel does not produce exact volume, though I appreciate your assumption we are not engineers and did not create a "perfect" volume tunnel.
4. We have found at a lower wind speeds that that we do get better results in the tunnel due to "constant" wind, has nothing to do with volume.
5. At higher wind speeds in the tunnel we get lower results than in the real world, has everything to do with volume.
6. Creating a power curve from any one piece of data is negligent and we are not utilizing the tunnel to create power curves, the purpose of our tunnel is to develop the best solution with the resources we have today.

In the real world a 10mph average wind is a very misleading number. The accelerated increase in energy production and conversion efficiency as the wind speed increases is so great that the difference between 10mph and 11mph could be almost doubled. Understanding this then applying it to trying to get a range of wind vs power in "average" conditions almost becomes impossible. An average wind speed of 10mph really means varying wind between maybe 5mph and 15mph. this would indicate that 50% of your energy production was greater than 10mph and at the accelerated power production your gross production is going to be greater than a wind tunnel test at 10mph. This is unfortunately how we applied our original power curve data and learned later that the "real world" can NOT be duplicated in a wind tunnel.

Unfortunately where we disagree is in I feel Betz, though a good starting point, does not represent a real word power curve. But we are striving to find a nice medium.

You appear to be very angry about our direction and development of a solution. I hope we have not offended you in our objectives to solve for what we feel is a very important solution. Are you a manufacturer of a product? Are you an engineer developing a solution for the average homeowner? Maybe if I understood your position within the industry I could better answer your comments.

I assure you we are not getting rich off our product which is the lowest priced turbine within our industry. We are a small privately owned company, we have NO government funding, not even a bank loan, we are growing and in a very poor economy employ quite a few people. Our customers understand/acknowledge our barriers and love our product. We have a 100% return policy – no questions asked. I would think this is very important and responsible. We constantly strive to improve our product and our resources for our clients.

I come personally from a completely different industry and have no engineering experience. I welcome your comments and appreciate your time to take such an interest in what we are doing.

I'm going to stop responding this blog feed, it's does not seem productive to me, I'm going to post this response and your comments our blog site on our DyoCore page, I would be happy to answer any questions you have posted to our blog to share with our clients.

Thanks for your input!

David Raine

DyoCore



[www.dyocore.com](http://www.dyocore.com)

p&f. 866-404-2428

c. 760-580-4271

[dave@dyocore.com](mailto:dave@dyocore.com)

---

**From:** Michael Klemen [<mailto:wind4energy@yahoo.com>]  
**Sent:** Saturday, February 12, 2011 5:58 AM  
**To:** David Raine  
**Subject:** RE: [s-w-h] Solar verses wind efficiency



David,

Regarding the WindPit, DyoCore has a lot to learn about what would produce a reasonable result in a wind tunnel. The wind tunnel blockage is too high. Power performance as measured in this wind tunnel with the turbine pictured will be higher than anybody will experience when the turbine is place is free and clear wind. Energy production will be overstated if power data is used from this setup.

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www.dyocore.com  
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c. 760-580-4271  
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**Subject:** Re: [s-w-h] Solar verses wind efficiency

David,

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**Subject:** RE: [s-w-h] Solar verses wind efficiency  
**From:** Michael Klemen (wind4energy@yahoo.com)  
**To:** dave@dyocore.com;  
**Date:** Monday, February 14, 2011 5:04 PM

---

David,

Yes, I replied to you only, as it seemed like you weren't interested in carrying the conversation in public. I thought maybe it would be productive anyways.

It sounds like you realize that there are drawbacks and limitations to what you can do testing your turbine in a controlled environment. That's good. That's the bottom line of what I was trying to communicate about the wind tunnel.

What I am trying to tell you about the DyoCore wind tunnel is that if the flow gets blocked too much, air is forced through the wind turbine in ways that are not going to happen in the real world. The walls are constraining the air. In real life, on a real tower, the wind can blow past the turbine, around it. In the DyoCore wind tunnel, the walls are forcing the air to go through the turbine, which is going to give measurements higher than in the real world. So don't be surprised when they don't match. It sounds like you know they won't match anyways for other reasons.

Yes, I fully understand the point about an average wind speed of 10 mph. Yes, you get winds from 5 mph to 15 mph, depending on the actual wind during the measurement. But that's the point. Sometimes the turbine is speeding up, and you don't realize a gain in RPM during the gust. Likewise, when the wind slows down, you take momentum out of the turbine when the wind energy just isn't there. A 10 mph average is just that...an average. The shorter the averaging time, the more you resemble the real output of a wind turbine at that instantaneous wind speed. It works itself out in the end.

#2) Betz' law is not the basis for a real power curve. A real power curve is MEASURED. Measure the wind speed. Measure the Power. Average

**Exhibit 58**

it. It has nothing to do with Betz. It never has. It never will. Read the IEC standard. It doesn't mention Betz when talking about Power Performance measurement. It tells you how to measure the data and how to take it so that you are actually measuring the right data. You can actually make a turbine, test it to the standard, and not even know about Betz.

I didn't mention volume. I don't understand why you keep mentioning it. The kicker is AREA, not volume. The air is either going to go around the turbine if the blockage is low enough, or be forced through the turbine if the blockage is too high. It's Area that counts, not volume.

"6. Creating a power curve from any one piece of data is negligent "

The standards define how to measure a power curve. It's pretty simple in theory. Harder to do in practice. The purpose of a power curve for the most part is to provide a basis for calculating expected annual energy performance. If you don't do the power curve this way, the energy calculation becomes less than accurate.

Regarding this comment: "Unfortunately where we disagree is in I feel Betz, though a good starting point, does not represent a real word power curve."

You are the only one that keeps bringing Betz into the equation regarding the power curve. Betz has no relationship to a power curve directly. It is simply a checkpoint to make sure your measurements pan out. Betz isn't a factor in measuring a power curve or calculating turbine performance (energy). I don't know how to say it any more clearly. Read the IEC standards or the AWEA standards. Betz is not a starting or an ending point for a real world power curve. The DyoCore web site references Betz with the power curve, and that indicates a lack of knowledge about both Betz and the power curve.

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Sincerely,  
Mike

--- On Mon, 2/14/11, David Raine <[dave@dyocore.com](mailto:dave@dyocore.com)> wrote:

From: David Raine <[dave@dyocore.com](mailto:dave@dyocore.com)>  
Subject: RE: [s-w-h] Solar verses wind efficiency  
To: "Michael Klemen" <[wind4energy@yahoo.com](mailto:wind4energy@yahoo.com)>  
Date: Monday, February 14, 2011, 4:01 PM

Hi Michael, looks like your post was just to me but you are welcome to post this for everyone in your forum.

Yes the "Wind Pit" is a great learning experience for us and for the industry. Not many companies get to actually test their products in a controlled environment.

I can understand your assumptions and initially would have thought the same myself, however, it turns out quite the opposite.

1. Exact volume – Betz's law (60" wind tunnel – 60" blade diameter) will create lower results than could be experienced in the real world. <http://www.symscape.com/blog/virtual-wind-turbine->

breaks-betz-law

2. Betz's law is the basis for most turbine power curves
3. Our tunnel does not produce exact volume, though I appreciate your assumption we are not engineers and did not create a "perfect" volume tunnel.
4. We have found at a lower wind speeds that that we do get better results in the tunnel due to "constant" wind, has nothing to do with volume.
5. At higher wind speeds in the tunnel we get lower results than in the real world, has everything to do with volume.
6. Creating a power curve from any one piece of data is negligent and we are not utilizing the tunnel to create power curves, the purpose of our tunnel is to develop the best solution with the resources we have today.

In the real world a 10mph average wind is a very misleading number. The accelerated increase in energy production and conversion efficiency as the wind speed increases is so great that the difference between 10mph and 11mph could be almost doubled. Understanding this then applying it to trying to get a range of wind vs power in "average" conditions almost becomes impossible. An average wind speed of 10mph really means varying wind between maybe 5mph and 15mph. this would indicate that 50% of your energy production was greater than 10mph and at the accelerated power production your gross production is going to be greater than a wind tunnel test at 10mph. This is unfortunately how we applied our original power curve data and learned later that the "real world" can NOT be duplicated in a wind tunnel.

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You appear to be very angry about our direction and development of a solution. I hope we have not offended you in our objectives to solve for what we feel is a very important solution. Are you a manufacturer of a product? Are you an engineer developing a solution for the average homeowner? Maybe if I understood your position within the industry I could better answer your comments.

I assure you we are not getting rich off our product which is the lowest priced turbine within our industry. We are a small privately owned company, we have NO government funding, not even a bank loan, we are growing and in a very poor economy employ quite a few people. Our customers understand/acknowledge our barriers and love our product. We have a 100% return policy – no questions asked. I would think this is very important and responsible. We constantly strive to improve our product and our resources for our clients.

I come personally from a completely different industry and have no engineering experience. I welcome your comments and appreciate your time to take such an interest in what we are doing.

I'm going to stop responding this blog feed, it's does not seem productive to me, I'm going to post this response and your comments our blog site on our DyoCore page, I would be happy to answer any questions you have posted to our blog to share with our clients.

Thanks for your input!

David Raine  
DyoCore



www.dyocore.com  
p&f. 866-404-2428

c. 760-580-4271  
dave@dyocore.com

---

**From:** Michael Klemen [mailto:wind4energy@yahoo.com]  
**Sent:** Saturday, February 12, 2011 5:58 AM  
**To:** David Raine  
**Subject:** RE: [s-w-h] Solar verses wind efficiency

David,

Regarding the WindPit, DyoCore has a lot to learn about what would produce a reasonable result in a wind tunnel. The wind tunnel blockage is too high. Power performance as measured in this wind tunnel with the turbine pictured will be higher than anybody will experience when the turbine is placed in free and clear wind. Energy production will be overstated if power data is used from this setup.

If any data is published from the WindPit, it will be in error, negligent, and incorrect.

Regarding the Power Curve that is on the DyoCore web site, it is clear that whoever created it does not understand the standards and how to acquire data. The data has absolutely nothing to do with Betz.

On this page:

<http://www.dyocore.com/windpower.html>

It states: "The difficulty in answering this question is compounded by the difficulty in obtaining accurate data to make energy production assumptions. Below is our attempt to simplify the answer. Though we can almost identify maximum capabilities it is difficult to accurately estimate wind speeds, consistency and conversion capabilities of the equipment being used"

The answer is not difficult. It is not difficult to obtain the necessary data according to the IEC or SWCC standards. The process is outlined pretty clearly. There is no need to accurately estimate anything. All you have to do is just measure it.

Further, it states:

"The following table provides a power curve as applied to the Betz law;"

Well, it is clear that whoever wrote this page and whoever took the data doesn't understand the difference between power performance measurement and the guideline provided by Betz. Power Curves are never applied to the Betz law. The



resultant power curve can be compared to the Betz law for reasonability.

Furthermore, on that same page, point #3 says: "Equipment efficiency is the final factor." Equipment efficiency is not a factor at all. The measured result of the power curve includes the equipment efficiency. It is built in to the measurement. There is no need to factor it in.

Lastly, this same web page states:

"Although the calculation of wind power illustrates important features about wind turbines, the best measure of wind turbine performance is annual energy output."

Wind power is NOT A CALCULATION. It is a measurement. Annual Energy output is a calculation because that standardizes the data to a normal site, and takes wind speed distribution on a given site out of the equation. Annual Energy Production from a single size cannot be used to estimate annual energy production at another site.

If you could explain the issues regarding the two sites in the IEC document on the DyoCore web site, the graph with estimated energy output can also be shown to be inaccurate. I know you don't want to hear that.

It is clear that whoever is producing this stuff doesn't really know what they are doing. I don't know how else to say it and show you other than explain all of the issues with it. I would hope that this would spur DyoCore to learn how to do the right thing.

Sincerely,  
Mike

--- On Fri, 2/11/11, David Raine <dave@dyocore.com> wrote:

From: David Raine <dave@dyocore.com>  
Subject: RE: [s-w-h] Solar verses wind efficiency  
To: "Michael Klemen" <wind4energy@yahoo.com>  
Date: Friday, February 11, 2011, 10:42 AM

Thank you.

David Raine  
DyoCore  
[www.dyocore.com](http://www.dyocore.com)  
p&f. 866-404-2428  
c. 760-580-4271  
[dave@dyocore.com](mailto:dave@dyocore.com)

---

From: Michael Klemen [mailto:[wind4energy@yahoo.com](mailto:wind4energy@yahoo.com)]  
Sent: Friday, February 11, 2011 4:28 AM  
To: David Raine  
Subject: Re: [s-w-h] Solar verses wind efficiency



David,

On this list, hit Reply All. Remove any recipients you do not want to send to.

While I appreciate the offer to visit your facility, I can save a lot of money simply looking at the data. The data simply does not add up, so a visit would not help with any of these issues.

Mike

--- On Thu, 2/10/11, David Raine <dave@dyocore.com> wrote:

From: David Raine <dave@dyocore.com>  
Subject: Re: [s-w-h] Solar verses wind efficiency  
To: "Michael Klemen" <wind4energy@yahoo.com>  
Date: Thursday, February 10, 2011, 11:52 PM

I am responding from my iPad, I simply hit reply.

David Raine

760-580-4271

On Feb 10, 2011, at 9:07 PM, Michael Klemen <wind4energy@yahoo.com> wrote:

David,

Please post that to the list. :)

This is not book knowledge. If you're getting this kind of power in the wind tunnel, the physics of that is perfectly explainable. I understand the idea of a roof mount and forcing the wind over the roof can add energy to the turbine. However, there is nothing in the publicly consumable data that indicates what a correct rating of the turbine would be in any other type of installation.

Please humor me for a moment and show me where your blogs talk about reconciling your numbers to real life. Please also humor my post regarding the document on the DyoCore web site that references the IEC standards. From everything that is plain to see, the reference is in words only, and that is all. The testing was not done in accordance with the IEC standards or any resemblance thereof.

Please humor me and post your first reply to the list, or are you afraid to? I'm not afraid of a discussion in public. It will demonstrate how serious you are about wanting to bring your technology to the mainstream. Hiding off the list and talking like this tells me more than anything else of this conversation.

Please demonstrate as you have said you can:

"The betz law does not and could not ever reflect real world conditions, I can demonstrate even under the most difficult conditions that direct force/volume never exists in the real world."

Words are easy to say...let's see your numbers!

Sincerely,  
Mike

--- On Thu, 2/10/11, David Raine <dave@dyocore.com> wrote:

From: David Raine <dave@dyocore.com>  
Subject: Re: [s-w-h] Solar verses wind efficiency  
To: "Michael Klemen" <wind4energy@yahoo.com>  
Date: Thursday, February 10, 2011, 9:57 PM

This a great point towards my contention with those that stick to numbers only, all of which is outlined in our blogs very thoroughly. The betz law does not and could not ever reflect real world conditions, I can demonstrate even under the most difficult conditions that direct force/volume never exists in the real world. Anyone can pick up a book and be a self proclaimed genius, but a book does you absolutely no good in the real world.

Your math is simply wrong. You are wrong.

David Raine  
760-580-4271

On Feb 10, 2011, at 6:43 PM, Michael Klemen <wind4energy@yahoo.com> wrote:

David,

I appreciate passion for something that is good and responsible!

It is hard to ignore some of the obvious things you mentioned.

"Professionals" don't have to do as you suggest. People with experience such as Mike Bergey do not need to spend a moment in your testing facility or test your turbine to know that what information that is publicly available tells us that the claims

are totally impossible. It is physically impossible to capture energy that doesn't exist.

I do note that you haven't talked about what Mike Bergey or myself said about the product. We weren't talking about a sales pitch or feelings.

Testing a wind turbine in a wind tunnel can be useful for a manufacturer, but cannot be used for any type of energy or performance information for public consumption.

Low speed wind conversion can be accomplished, but at what cost? If you refer to my Perfect Turbine page (which I sent in my prior post), you'll see that at a 35% conversion efficiency, you will only get 4.74 kWh per month per square meter of capture area. That assumes a Rayleigh distribution.

Do the math. The DyoCore turbine is just over 1 square meter. The installed cost of a turbine to generate 75 cents of electricity per month (15 c/kwh) has got to be cheaper than dirt! I recall that you previously claimed that 6 mph was a decent wind site for installing a wind turbine. A single nominal 100 watt solar panel for 4 sun hours/day would yield .4 kWh/day or 12 kWh/month. At \$2/watt, that would be a \$200 investment plus an inverter. That would generate 3 times the energy at 1/8 the cost!

I'm just trying to keep your statements in perspective.

There just isn't enough energy in the wind at that average wind speed to make it worthwhile. At 10 mph, the energy available for harvest is 5 times higher than 6 mph. Now generating 25 kWh per month per m<sup>2</sup>, this gets to be more credible. Compared to the PV, that's now twice the energy than the PV at 8 times the cost.

> I believe strongly low wind conversion can be  
> accomplished. Maybe not today but very soon. I invite  
> this group to think a bit more about that flying  
> pig.

So, given the physics, what kind of a flying pig is it?  
You can't capture energy that doesn't exist. That's just reality.

> We stand behind our product 100%! We accept returns NO  
> QUESTIONS ASKED full refund if our customers feel SolAir  
> will not fit their needs

But do you also refund installation costs when the turbine doesn't perform as expected? You cannot refund the faith that people had in a product when it disappoints. You

cannot refund the faith and hope people had in wind energy when it doesn't deliver. That's why we're asking these questions.

- > We are most likely the only turbine manufacture with an
- > in-house wind tunnel for testing.

Nope. Southwest Wind Power has a wind tunnel for research. I bet there are more.

Sincerely,  
Mike Klemen

---

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THANK YOU FOR PARTICIPATING IN THE HOME ENERGY LIST.

- . Please feel free to send your input to:  
[small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)
- . Join the list by sending a blank e-mail to:  
[small-wind-home-subscribe@yahoogroups.com](mailto:small-wind-home-subscribe@yahoogroups.com)
- . To view previous messages from the list,  
subscribe to a daily digest of the list,  
or stop receiving the list by e-mail  
(and read it on the Web), go to  
<http://www.yahoo.com/group/small-wind-home>
- . An FAQ on small wind systems is located at  
<http://www.ndsu.ndak.edu/ndsu/klemen>

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**Subject:** RE: [s-w-h] Solar verses wind efficiency  
**From:** David Raine (dave@dyocore.com)  
**To:** wind4energy@yahoo.com;  
**Date:** Tuesday, February 15, 2011 8:53 PM

---

Hi Mike,

Thanks for your overview. I appreciate your patience with us. We are learning quite a bit as we grow and do not have all the answers / solutions today.

Yes, we had no idea what the Betz curve was or how it applied when we did our testing. We also at the time reached out to as many people and companies as we could to do our testing including the AWEA. Unfortunately it was too early on in the stages of small wind, even today I feel the industry is still way to young and not near enough resources exist to support and educate the real small wind market.

I get a lot of inquires that our power curve is "outside" the Betz curve, so my response was miss-directed to you, I thought this was your question.

When calculating our average annual wind we used the actually pooled "average" wind speed. Each pool was compiled of 10 minute data sets which further flawed our calculations. We should have used an average that was slightly higher to account for the dramatic production escalation during gusts. The HOBO equipment we additionally used at one location only measured wind production power, not conversion power. this was another flaw in our early stages. At one location we charged batteries with a dump load, at the other location we tied directly to the grid with a resistance meter.

However, this still demonstrated a great platform for an Average Annual Wind Speed calculation of our turbines, in the end the average wind that we recorded showed the results we indicated. The battery bank with a dump load was not an exact science and results where a bit higher than expected (San Marcos location) but this was also because we had no step up, in most conditions we easily produced enough constant low wind voltage that our battery charging efficiency was very high. We've gained a tremendous amount of experience through this frustrating process. Would we do it different going forward – YES, and we are!

We are currently testing again right now and looking at more field data from over a 100 installs. By mid this year up to about 500 install sites both in the US and Internationally – some by colleges and testing facilities. These all tied to inverters that collect all production data, on a few we will be collecting wind and other environmental/performance data that is not readily available within the community. It will be about 6 more months to a year before we able to provide

**Exhibit 59**

more details on these sites, some of which do very well, others that do not, it will be a great mix. At current our IL location with two units now is actually doing better than our initial results, but average annual wind speeds at this location have gone up about 50%! Additionally our in-house testing is allowing us to improve greatly on the conversion efficiency and even somewhat on the performance of the turbine in rapidly changing wind conditions.

Working with David Zahn we are very close to almost 500% greater efficiency in voltage ranges under 25v!

Unfortunately until you build up some market momentum the resources to even do these tests are not financially reasonable or even readily available. Getting funding or even a professional facility to test our product 4 years ago was like talking someone into jumping off a bridge. Even today facilities are asking for 50 to 100k to test a product with no guarantee of costs or timeline. What small company has this capability or funding in today's economy. I hope to not only build a great product but to extend our experience and resources to other manufacturers FREE!

I regret your experience with small wind and more importantly small wind manufactures has been so negative. Mine as well but that is why I created SolAir and DyoCore, I never wanted to manufacture turbines, I simply wanted to make energy at my home which is somewhat the average home in the US. A large 60' pole mount turbine was not an option for me and I felt not a real option for about 99% of Americans.

Like you our objectives are very similar we want accurate information, we want to educate and we want satisfied clients. It appears you are aware of the CA rebate, we could easily sell tens of thousands of turbines right now in CA, our objective is to sell what will work, not what is free! Only a few hundred turbines a month go through our family owned factory. I get offers daily because of our listing and certifications for the buyout of our company or manufacturer thousands of our turbine – I wouldn't consider either. I personally spend most of my days talking clients out of buying our product. You really need wind conditions over 10mph to get even a small reasonable amount of annual production, live able conditions are 12mph or greater annually, optimal are 18mph or greater but not many every experience these conditions.

Everyone that buys my product is very aware of these facts and the potential that SolAir will be a simple air vane on their roof if they do not have the right conditions. For every turbine we sell we have a dozen or so we turned down. We take every dollar (keep in mind we also have the lowest cost turbine on the CEC list) and turn it back into the improvement of our product and the conversion of energy in which we then support in the field 100% for the continued improvement of our market. I wish even one turbine manufacturer demonstrated this integrity, I would stop building mine tomorrow and buy theirs!

I really don't know who to make our information more accurate other than what we do now. I regret if you still feel we negligent in our product and direction.

My background is also computer science. And who your are, what you did and what you do now always matters- even if it's only to yourself.



David Raine

DyoCore



[www.dyocore.com](http://www.dyocore.com)

p&f. 866-404-2428

c. 760-580-4271

[dave@dyocore.com](mailto:dave@dyocore.com)

---

**From:** Michael Klemen [<mailto:wind4energy@yahoo.com>]

**Sent:** Monday, February 14, 2011 3:04 PM

**To:** David Raine

**Subject:** RE: [s-w-h] Solar verses wind efficiency

David,

Yes, I replied to you only, as it seemed like you weren't interested in carrying the conversation in public. I thought maybe it would be productive anyways.

It sounds like you realize that there are drawbacks and limitations to what you can do testing your turbine in a controlled environment. That's good. That's the bottom line of what I was trying to communicate about the wind tunnel.

What I am trying to tell you about the DyoCore wind tunnel is that if the flow gets blocked too much, air is forced through the wind turbine in ways that are not going to happen in the real world. The walls are constraining the air. In real life, on a real tower, the wind can blow past the turbine, around it. In the DyoCore wind tunnel, the walls are forcing the air to go through the turbine, which is going to give measurements higher than in the real world. So don't be surprised when they don't match. It sounds like you know they won't match anyways for other reasons.

Yes, I fully understand the point about an average wind speed of 10 mph. Yes, you get winds from 5 mph to 15 mph, depending on the actual wind during the measurement. But that's the point. Sometimes the turbine

is speeding up, and you don't realize a gain in RPM during the gust. Likewise, when the wind slows down, you take momentum out of the turbine when the wind energy just isn't there. A 10 mph average is just that...an average. The shorter the averaging time, the more you resemble the real output of a wind turbine at that instantaneous wind speed. It works itself out in the end.

#2) Betz' law is not the basis for a real power curve. A real power curve is MEASURED. Measure the wind speed. Measure the Power. Average it. It has nothing to do with Betz. It never has. It never will. Read the IEC standard. It doesn't mention Betz when talking about Power Performance measurement. It tells you how to measure the data and how to take it so that you are actually measuring the right data. You can actually make a turbine, test it to the standard, and not even know about Betz.

I didn't mention volume. I don't understand why you keep mentioning it. The kicker is AREA, not volume. The air is either going to go around the turbine if the blockage is low enough, or be forced through the turbine if the blockage is too high. It's Area that counts, not volume.

"6. Creating a power curve from any one piece of data is negligent "

The standards define how to measure a power curve. It's pretty simple in theory. Harder to do in practice. The purpose of a power curve for the most part is to provide a basis for calculating expected annual energy performance. If you don't do the power curve this way, the energy calculation becomes less than accurate.

Regarding this comment: "Unfortunately where we disagree is in I feel Betz, though a good starting point, does not represent a real word power curve."

You are the only one that keeps bringing Betz into the equation regarding the power curve. Betz has no relationship to a power curve directly. It is simply a checkpoint to make sure your measurements pan out. Betz isn't a factor in measuring a power curve or calculating turbine performance (energy). I don't know how to say it any more clearly. Read the IEC standards or the AWEA standards. Betz is not a starting or an ending point for a real world power curve. The DyoCore web site references Betz with the power curve, and that indicates a lack of knowledge about both Betz and the power curve.

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seem like much of a talking point to me. I know people who have installed cheap turbines and walked away from them when things didn't work...it wasn't worth their time and effort to resolve any issues.

My goals in these discussions have been:

- 1) To hopefully get DyoCore to remove the false information from the web site.
- 2) Educate DyoCore about the wind tunnel. (done)
- 3) Encourage DyoCore to get correct information about their turbine on the web site.

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Sincerely,  
Mike

--- On Mon, 2/14/11, David Raine <dave@dyocore.com> wrote:

From: David Raine <dave@dyocore.com>  
Subject: RE: [s-w-h] Solar verses wind efficiency  
To: "Michael Klemen" <wind4energy@yahoo.com>  
Date: Monday, February 14, 2011, 4:01 PM

Hi Michael, looks like your post was just to me but you are welcome to post this for everyone in your forum.

Yes the "Wind Pit" is a great learning experience for us and for the industry. Not many companies get to actually test their products in a controlled environment.

I can understand your assumptions and initially would have thought the same myself, however, it turns out quite the opposite.

1. Exact volume – Betz's law (60" wind tunnel – 60" blade diameter) will create lower results than could be experienced in the real world. <http://www.symscape.com/blog/virtual-wind-turbine-breaks-betz-law>
2. Betz's law is the basis for most turbine power curves
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Unfortunately where we disagree is in I feel Betz, though a good starting point, does not represent a real word power curve. But we are striving to find a nice medium.

You appear to be very angry about our direction and development of a solution. I hope we have not offended you in our objectives to solve for what we feel is a very important solution. Are you a manufacturer of a product? Are you an engineer developing a solution for the average homeowner? Maybe if I understood your position within the industry I could better answer your comments.

I assure you we are not getting rich off our product which is the lowest priced turbine within our industry. We are a small privately owned company, we have NO government funding, not even a bank loan, we are growing and in a very poor economy employ quite a few people. Our customers understand/acknowledge our barriers and love our product. We have a 100% return policy – no questions asked. I would think this is very important and responsible. We constantly strive to improve our product and our resources for our clients.

I come personally from a completely different industry and have no engineering experience. I welcome your comments and appreciate your time to take such an interest in what we are doing.

I'm going to stop responding this blog feed, it's does not seem productive to me, I'm going to post this response and your comments our blog site on our DyoCore page, I would be happy to answer any questions you have posted to our blog to share with our clients.

Thanks for your input!

David Raine  
DyoCore



[www.dyocore.com](http://www.dyocore.com)  
p&f. 866-404-2428  
c. 760-580-4271  
[dave@dyocore.com](mailto:dave@dyocore.com)

---

**From:** Michael Klemen [<mailto:wind4energy@yahoo.com>]  
**Sent:** Saturday, February 12, 2011 5:58 AM  
**To:** David Raine  
**Subject:** RE: [s-w-h] Solar verses wind efficiency

David,

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On this page:

<http://www.dyocore.com/windpower.html>

It states: "The difficulty in answering this question is compounded by the difficulty in obtaining accurate data to make energy production assumptions. Below is our attempt to simplify the answer. Though we can almost identify maximum capabilities it is difficult to accurately estimate wind speeds, consistency and conversion capabilities of the equipment being used"

The answer is not difficult. It is not difficult to obtain the necessary data according to the IEC or SWCC standards. The process is outlined pretty clearly. There is no need to accurately estimate anything. All you have to do is just measure it.

Further, it states:

"The following table provides a power curve as applied to the Betz law;"

Well, it is clear that whoever wrote this page and whoever took the data doesn't understand the difference between power performance measurement and the guideline provided by Betz. Power Curves are never applied to the Betz law. The resultant power curve can be compared to the Betz law for reasonability.

Furthermore, on that same page, point #3 says: "Equipment efficiency is the final factor." Equipment efficiency is not a factor at all. The measured result of the power curve includes the equipment efficiency. It is built in to the measurement. There is no need to factor it in.



Lastly, this same web page states:

"Although the calculation of wind power illustrates important features about wind turbines, the best measure of wind turbine performance is annual energy output."

Wind power is NOT A CALCULATION. It is a measurement. Annual Energy output is a calculation because that standardizes the data to a normal site, and takes wind speed distribution on a given site out of the equation. Annual Energy Production from a single site cannot be used to estimate annual energy production at another site.

If you could explain the issues regarding the two sites in the IEC document on the DyoCore web site, the graph with estimated energy output can also be shown to be inaccurate. I know you don't want to hear that.

It is clear that whoever is producing this stuff doesn't really know what they are doing. I don't know how else to say it and show you other than explain all of the issues with it. I would hope that this would spur DyoCore to learn how to do the right thing.

Sincerely,  
Mike

--- On **Fri, 2/11/11**, **David Raine** <dave@dyocore.com> wrote:

From: David Raine <dave@dyocore.com>  
Subject: RE: [s-w-h] Solar verses wind efficiency  
To: "Michael Klemen" <wind4energy@yahoo.com>  
Date: Friday, February 11, 2011, 10:42 AM

Thank you.

David Raine

DyoCore  
[www.dyocore.com](http://www.dyocore.com)

p&f. 866-404-2428

c. 760-580-4271

dave@dyocore.com

---

**From:** Michael Klemen [mailto:wind4energy@yahoo.com]  
**Sent:** Friday, February 11, 2011 4:28 AM  
**To:** David Raine  
**Subject:** Re: [s-w-h] Solar verses wind efficiency

David,



On this list, hit Reply All. Remove any recipients you do not want to send to.

While I appreciate the offer to visit your facility, I can save a lot of money simply looking at the data. The data simply does not add up, so a visit would not help with any of these issues.

Mike

--- On **Thu, 2/10/11, David Raine** <dave@dyocore.com> wrote:

From: David Raine <dave@dyocore.com>  
Subject: Re: [s-w-h] Solar verses wind efficiency  
To: "Michael Klemen" <wind4energy@yahoo.com>  
Date: Thursday, February 10, 2011, 11:52 PM

I am responding from my iPad, I simply hit reply.

David Raine

760-580-4271

On Feb 10, 2011, at 9:07 PM, Michael Klemen <wind4energy@yahoo.com> wrote:

David,

Please post that to the list. :)

This is not book knowledge. If you're getting this kind of power in the wind tunnel, the physics of that is perfectly explainable. I understand the idea of a roof mount and forcing the wind over the roof can add energy to the turbine. However, there is nothing in the publicly consumable data that indicates what a correct rating of the turbine would be in any other type of installation.

Please humor me for a moment and show me where your blogs talk about reconciling your numbers to real life. Please also humor my post regarding the document on the DyoCore web site that references the IEC standards. From everything that is plain to see, the reference is in words only, and that is all. The testing was not done in accordance with the IEC standards or any resemblance thereof.

Please humor me and post your first reply to the list, or are you afraid to? I'm not afraid of a discussion in public. It will demonstrate how serious you are about wanting to bring your technology to the mainstream. Hiding off the list and talking like this tells me more than anything else of this conversation.

Please demonstrate as you have said you can:

"The betz law does not and could not ever reflect real world conditions, I can demonstrate even under the most difficult conditions that direct force/volume never exists in the real world."

Words are easy to say...let's see your numbers!

Sincerely,  
Mike

--- On **Thu, 2/10/11, David Raine** <dave@dyocore.com> wrote:

From: David Raine <dave@dyocore.com>  
Subject: Re: [s-w-h] Solar verses wind efficiency  
To: "Michael Klemen" <wind4energy@yahoo.com>  
Date: Thursday, February 10, 2011, 9:57 PM

This a great point towards my contention with those that stick to numbers only, all of which is outlined in our blogs very thoroughly. The betz law does not and could not ever reflect real world conditions, I can demonstrate even under the most difficult conditions that direct force/volume never exists in the real world. Anyone can pick up a book and be a self proclaimed genius, but a book does you absolutely no good in the real world. Your math is simply wrong. You are wrong.

David Raine  
760-580-4271

On Feb 10, 2011, at 6:43 PM, Michael Klemen <wind4energy@yahoo.com> wrote:

David,

I appreciate passion for something that is good and responsible!

It is hard to ignore some of the obvious things you mentioned.

"Professionals" don't have to do as you suggest. People with experience such as Mike Bergey do not need to spend a moment in your testing facility or test your turbine to know that what information that is publicly available tells us that the claims are totally impossible. It is physically impossible to capture

energy that doesn't exist.

I do note that you haven't talked about what Mike Bergey or myself said about the product. We weren't talking about a sales pitch or feelings.

Testing a wind turbine in a wind tunnel can be useful for a manufacturer, but cannot be used for any type of energy or performance information for public consumption.

Low speed wind conversion can be accomplished, but at what cost? If you refer to my Perfect Turbine page (which I sent in my prior post), you'll see that at a 35% conversion efficiency, you will only get 4.74 kWh per month per square meter of capture area. That assumes a Rayleigh distribution.

Do the math. The DyoCore turbine is just over 1 square meter. The installed cost of a turbine to generate 75 cents of electricity per month (15 c/kwh) has got to be cheaper than dirt! I recall that you previously claimed that 6 mph was a decent wind site for installing a wind turbine. A single nominal 100 watt solar panel for 4 sun hours/day would yield .4 kWh/day or 12 kWh/month. At \$2/watt, that would be a \$200 investment plus an inverter. That would generate 3 times the energy at 1/8 the cost!

I'm just trying to keep your statements in perspective.

There just isn't enough energy in the wind at that average wind speed to make it worthwhile. At 10 mph, the energy available for harvest is 5 times higher than 6 mph. Now generating 25 kWh per month per m<sup>2</sup>, this gets to be more credible. Compared to the PV, that's now twice the energy than the PV at 8 times the cost.

> I believe strongly low wind conversion can be  
> accomplished. Maybe not today but very soon. I invite  
> this group to think a bit more about that flying  
> pig.

So, given the physics, what kind of a flying pig is it?  
You can't capture energy that doesn't exist. That's just reality.

> We stand behind our product 100%! We accept returns NO  
> QUESTIONS ASKED full refund if our customers feel SolAir  
> will not fit their needs

But do you also refund installation costs when the turbine doesn't perform as expected? You cannot refund the faith that people had in a product when it disappoints. You cannot refund the faith and hope people had in wind energy

when it doesn't deliver. That's why we're asking these questions.

- > We are most likely the only turbine manufacture with an
- > in-house wind tunnel for testing.

Nope. Southwest Wind Power has a wind tunnel for research. I bet there are more.

Sincerely,  
Mike Klemen

---

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<http://www.yahogroups.com/list/small-wind-home>  
An FAQ on small wind systems is located at  
<http://www.ndsu.nodak.edu/ndsu/klemen>

---

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---

**Subject:** [s-w-h] Article on DyoCore  
**From:** Mike Bergey (mbergey@bergey.com)  
**To:** small-wind-home@yahoogroups.com;  
**Date:** Monday, March 21, 2011 6:16 AM

---

We've discussed DyoCore on this listserv. The following article covers DyoCore's crashing the CEC rebate program. Be sure to read the comments.

<http://www.greentechmedia.com/articles/read/have-small-wind-manufacturers-exploited-loop-holes-in-california-rebates/>

I believe there's a follow-on article in the works.

Mike Bergey  
President  
Bergey Windpower Co.  
2200 Industrial Blvd.  
Norman, OK 73069 USA  
Tel: 405-364-4212  
Fax: 405-364-2078  
E-mail: mbergey@bergey.com  
Web Site: www.bergey.com

---

---

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**Exhibit 60**

or stop receiving the list by e-mail  
(and read it on the Web), go to  
<http://www.yahoogroups.com/list/small-wind-home> .  
An FAQ on small wind systems is located at  
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<http://docs.yahoo.com/info/terms/>



---

**Subject:** RE: [s-w-h] Article on DyoCore

**From:** David (dave@dyocore.com)

**To:** mbergey@bergey.com; small-wind-home@yahoogroups.com;

**Date:** Monday, March 21, 2011 7:45 AM

---

It's very unfortunate Mr. Bergey feels very threatened by DyoCore. I regret he has not shown any professionalism or restraint. His stance is bias against low wind and even more bias against products that demonstrate how overpriced his own product is in comparison. If anyone would like to take a more formal approach to learning about DyoCore, our vision, objectives and development please contact me directly at anytime. We have worked very hard over these past several years to make small wind affordable, practical and reliable for the average homeowner. It is not a small accomplishment and we have a long way to go.

DyoCore has a great relationship with the CEC and is working with the CEC to hopefully qualify installations of our product in the future. Unfortunately products like Bergy only represent less than 1% of all Californians in possibly of application and less than maybe a tenth of that in affordability. Until SolAir the average homeowner, who also funds the program, couldn't afford or get permitting for a solution. Over the past year we have changed this dramatically and now allow the program to represent a significantly broader base of the very residents that fund the program. It's our goal within the next year to double that list.

We are working aggressively with many industry leaders in making Small Wind a very real and viable solution. DyoCore has accomplished more than any other wind manufacturer in CA, hopefully with greater resources and professional assistance we can continue to make small wind a real solution.

To learn more about DyoCore, [www.dyocore.com](http://www.dyocore.com)

**Exhibit 61**

Best wishes,

David Raine

[dave@dyocore.com](mailto:dave@dyocore.com)

[www.dyocore.com](http://www.dyocore.com)

From: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
[<mailto:small-wind-home@yahoogroups.com>] On Behalf Of Mike Bergey  
Sent: Monday, March 21, 2011 4:17 AM  
To: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
Subject: [s-w-h] Article on DyoCore

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<http://www.greentechmedia.com/articles/read/have-small-wind-manufacturers-exploited-loopholes-in-california-rebates/>

I believe there's a follow-on article in the works.

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[Non-text portions of this message have been removed]

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**Subject:** RE: [s-w-h] Article on DyoCore

---

**From:** Michael Klemen (wind4energy@yahoo.com)

**To:** small-wind-home@yahoogroups.com;

---

**Date:** Monday, March 21, 2011 12:18 PM

---

David,

I have to totally disagree with you on Mike Bergey's professionalism. In my opinion, it is you that has shown no restraint and lack of professionalism.

Mike Bergey is not threatened by DyoCore. It is the entire small wind industry that he has been part of for decades that is threatened. When a product that cannot deliver on its promises is sold, that makes all similar products look bad. When that product is purchased with taxpayer money, it makes the entire industry look bad. DyoCore wasn't in business back in the '80's (I think) when Federal Tax money was spent on small wind energy. The aftermath of those first subsidies nearly destroyed the industry.

David, you and I carried on a private conversation about DyoCore's turbine and the lack of quality data and how out of sorts your web site is with reality. It was absolutely clear to me that DyoCore really doesn't know what they're doing with performance measurement. You never addressed the discrepancies in the data that I pointed out. You only wanted me to come to your site and see one in action. Seeing one in action doesn't change anything. Based on all of the data that Dyocore made available, there is no need for me to come to your site. DyoCore needs to learn more and get their message to be consistent with reality. Some of the comments on the article are exactly the same things that I said to you.

Here's something DyoCore can do. Get this turbine certified

**Exhibit 62**

by the SWCC. That will separate the wheat from the chaff, and we'll see where things stand. I'll get off my soap box. I promise. In fact, I bet Mike Bergey and everybody else will quit complaining about DyoCore. Why? Because the issues with the data will be addressed by the certification. DyoCore would then be held accountable for its marketing materials - and they would then be comparable to every other certified turbine in the industry.

It's sad to me that with so many people explaining such basic things about wind energy to DyoCore, that it's been totally ignored. There are people in the industry that know what they're talking about - if DyoCore would only listen.

I understand DyoCore wants to believe in themselves and their product, but there should come a time even in the believer's mind that a good reality check is not a bad thing. It could save a lot of effort, a lot of money, some credibility, and maybe even a company.

Lastly, I'll quote you: "If anyone would like to take a more formal approach to learning about DyoCore, our vision, objectives and development"

I'd like so see DyoCore take a formal approach to providing the correct facts about it's turbine. Marketing should be 2nd place to factual information.

Sincerely,  
Mike Klemen

--- On Mon, 3/21/11, David <dave@dyocore.com> wrote:

> From: David <dave@dyocore.com>  
> Subject: RE: [s-w-h] Article on DyoCore  
> To: "Mike Bergey" <mbergey@bergey.com>, small-wind-home@yahoogroups.com  
> Date: Monday, March 21, 2011, 7:45 AM  
> It's very unfortunate Mr. Bergey  
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>  
> To learn more about DyoCore, [www.dyocore.com](http://www.dyocore.com)  
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>  
> Best wishes,  
>  
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>  
> David Raine  
>  
> [dave@dyocore.com](mailto:dave@dyocore.com)  
>  
> [www.dyocore.com](http://www.dyocore.com)  
>  
>  
>  
> From: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
> [<mailto:small-wind-home@yahoogroups.com>]  
> On Behalf Of Mike Bergey  
> Sent: Monday, March 21, 2011 4:17 AM  
> To: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
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> Mike Bergey

> President

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> Tel: 405-364-4212

> Fax: 405-364-2078

> E-mail: [mbergey@bergey.com](mailto:mbergey@bergey.com)

> <<mailto:mbergey%40bergey.com>>

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> 

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>

**Subject:** RE: [s-w-h] Article on DyoCore  
**From:** Dave Merrill (dmerrill7@juno.com)  
**To:** wind4energy@yahoo.com;  
**Cc:** small-wind-home@yahoogroups.com;  
**Date:** Monday, March 21, 2011 2:26 PM

Mike, Well written and articulated. I especially liked the last line - "Marketing should be 2nd place to factual information". There are soooo many marketing / fund raising intensive wind turbine manufacturers, and tooooo few engineering orientated wind turbine manufacturers. And it gets complicated when the "new comers" are blinded by their own product literature and won't accept wisdom and physics facts from others in the field. Liked the letter, Dave Merrill

SunAir Systems

NABCEP, Certified Solar Installer

(815) 234-2530

(815) 262-2831 cell

----- Original Message -----

From: Michael Klemen <wind4energy@yahoo.com>

To: small-wind-home@yahoogroups.com

Subject: RE: [s-w-h] Article on DyoCore

Date: Mon, 21 Mar 2011 10:18:46 -0700 (PDT)

David,

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Mike Bergey is not threatened by DyoCore. ♦ It is the entire small wind industry that he has been part of for decades that is threatened. ♦ When a product that cannot deliver on its promises is sold, that makes all similar products look bad. ♦ When that product is purchased with taxpayer money, it makes the entire industry look bad. ♦ DyoCore wasn't in business back in the '80's (I think) when Federal Tax money was spent

**Exhibit 63**

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I'd like so see DyoCore take a formal approach to providing the correct facts about it's turbine. Marketing should be 2nd place to factual information.

Sincerely,  
Mike Klemen

--- On Mon, 3/21/11, David <dave@dyocore.com> wrote:

> From: David <dave@dyocore.com>  
> Subject: RE: [s-w-h] Article on DyoCore  
> To: "Mike Bergey" <mbergey@bergey.com>, small-wind-home@yahoogroups.com  
> Date: Monday, March 21, 2011, 7:45 AM  
> It's very unfortunate Mr. Bergey  
> feels very threatened by DyoCore.💎 I regret  
> he has not shown any professionalism or restraint.💎  
> His stance is bias  
> against low wind and even more bias against products that  
> demonstrate how  
> overpriced his own product is in  
> comparison.💎💎💎If anyone would like to take  
> a more formal approach to learning about DyoCore, our  
> vision, objectives and  
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> have worked very hard  
> over these past several years to make small wind  
> affordable, practical and  
> reliable for the average homeowner.💎 It is not a small  
> accomplishment and we  
> have a long way to go.💎  
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>💎  
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> DyoCore has a great relationship with the CEC and is  
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> program. ♦ It's our goal within the next year to double  
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> ♦  
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> making Small Wind  
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> professional assistance we can continue to make small wind  
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> ♦  
>  
> To learn more about DyoCore, ♦ [www.dyocore.com](http://www.dyocore.com)  
>  
> ♦  
>  
> Best wishes,  
>  
> ♦  
>  
> David Raine  
>  
> [dave@dyocore.com](mailto:dave@dyocore.com)  
>  
> [www.dyocore.com](http://www.dyocore.com)

>  
> ?  
>  
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> [mailto:small-wind-home@yahoogroups.com]  
> On Behalf Of Mike Bergey  
> Sent: Monday, March 21, 2011 4:17 AM  
> To: small-wind-home@yahoogroups.com  
> Subject: [s-w-h] Article on DyoCore  
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> ?  
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> ?  
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> We've discussed DyoCore on this listserv. The following  
> article covers  
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>  
> I believe there's a follow-on article in the works.  
>  
> Mike Bergey  
> President  
> Bergey Windpower Co.  
> 2200 Industrial Blvd.  
> Norman, OK 73069 USA  
> Tel: 405-364-4212  
> Fax: 405-364-2078  
> E-mail: mbergey@bergey.com  
> <mailto:mbergey%40bergey.com>  
> Web Site: www.bergey.com  
>  
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> [Non-text portions of this message have been removed]  
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> =====  
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<\*> Your email settings:

Individual Email | Traditional

<\*> To change settings online go to:

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(Yahoo! ID required)

<\*> To change settings via email:

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[small-wind-home-fullfeatured@yahoogroups.com](mailto:small-wind-home-fullfeatured@yahoogroups.com)

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<\*> Your use of Yahoo! Groups is subject to:

<http://docs.yahoo.com/info/terms/>



**Subject:** RE: [s-w-h] Article on DyoCore  
**From:** David (dave@dyocore.com)  
**To:** wind4energy@yahoo.com; small-wind-home@yahoogroups.com;  
**Date:** Monday, March 21, 2011 6:53 PM

---

Hi Michael, hope you are well. Yes I answered your questions and posted the information directly to our site. As I mentioned I try to stay away from this blog as it has taken a wrong direction. A forum towards education and development support would be a stronger approach.

If our product was installed on a 100 foot pole with a similar wind diameter to a larger system it would perform exactly like other available turbines and the only additional cost would be the pole and larger blades. Still placing the price considerably less than the comparison. Our motor can be configured for a wide range of performance expectations. This is a very simple accomplishment in changing the windings and poles to meet your expectations. Our blade size and application appear to be the contention.

To address cost would be wrong as our turbine retails for only \$1800. This is the amongst the lowest cost solutions in the market and backed 100% by us. There are very few comparable products on the market.

Our target however is the residential market, not remote farmers or large property owners. Our product applies to a much broader spectrum and is sold all over the world. CA is a very small market for us in comparison. Yes we have only been developing since 2004 but we are self-funded and have taken no government funding. This additionally is something most turbine manufacturers cannot say though I'm not indicating this is a specific benefit other than it demonstrates our integrity. We did not develop our product around a program and had no idea the CEC program existed a few years ago.

We cannot simply dismiss the potential of low wind just because it is not very efficient today, this will change and regardless of the CEC rebate or any federal program we are working hard to encourage the development of greater efficiencies and products within this space. We have accomplished a lot in just this last year alone. The quality of our product and our motor performance is solid, it was designed for lower wind conditions. Yes with a smaller blade diameter we are limited to the mathematical potential of the available wind torque, but these numbers show a lot of promise in making small wind a real solution for the majority opposed to the few.

We are working with the SWCC towards certification. We are more importantly working with complete independent companies and direct reporting of systems on actual homes over the next year that will be readily available directly from our site. Both the good and the bad. For the past year we have been reaching out to be more involved within the community and to encourage similar product, applications and development.

**Exhibit 64**

---

**From:** small-wind-home@yahoogroups.com [mailto:small-wind-home@yahoogroups.com] **On Behalf Of** Michael Klemen  
**Sent:** Monday, March 21, 2011 10:19 AM  
**To:** small-wind-home@yahoogroups.com  
**Subject:** RE: [s-w-h] Article on DyoCore

David,

I have to totally disagree with you on Mike Bergey's professionalism. In my opinion, it is you that has shown no restraint and lack of professionalism.

Mike Bergey is not threatened by DyoCore. It is the entire small wind industry that he has been part of for decades that is threatened. When a product that cannot deliver on its promises is sold, that makes all similar products look bad. When that product is purchased with taxpayer money, it makes the entire industry look bad. DyoCore wasn't in business back in the '80's (I think) when Federal Tax money was spent on small wind energy. The aftermath of those first subsidies nearly destroyed the industry.

David, you and I carried on a private conversation about DyoCore's turbine and the lack of quality data and how out of sorts your web site is with reality. It was absolutely clear to me that DyoCore really doesn't know what they're doing with performance measurement. You never addressed the discrepancies in the data that I pointed out. You only wanted me to come to your site and see one in action. Seeing one in action doesn't change anything. Based on all of the data that Dyocore made available, there is no need for me to come to your site. DyoCore needs to learn more and get their message to be consistent with reality. Some of the comments on the article are exactly the same things that I said to you.

Here's something DyoCore can do. Get this turbine certified by the SWCC. That will separate the wheat from the chaff, and we'll see where things stand. I'll get off my soap box. I promise. In fact, I bet Mike Bergey and everybody else will quit complaining about DyoCore. Why? Because the issues with

the data will be addressed by the certification. DyoCore would then be held accountable for its marketing materials - and they would then be comparable to every other certified turbine in the industry.

It's sad to me that with so many people explaining such basic things about wind energy to DyoCore, that it's been totally ignored. There are people in the industry that know what they're talking about - if DyoCore would only listen.

I understand DyoCore wants to believe in themselves and their product, but there should come a time even in the believer's mind that a good reality check is not a bad thing. It could save a lot of effort, a lot of money, some credibility, and maybe even a company.

Lastly, I'll quote you: "If anyone would like to take a more formal approach to learning about DyoCore, our vision, objectives and development"

I'd like so see DyoCore take a formal approach to providing the correct facts about it's turbine. Marketing should be 2nd place to factual information.

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- > Date: Monday, March 21, 2011, 7:45 AM
- > It's very unfortunate Mr. Bergey
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> To learn more about DyoCore, [www.dyocore.com](http://www.dyocore.com)  
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>  
>  
> Best wishes,  
>  
>  
>  
> David Raine  
>  
> [dave@dyocore.com](mailto:dave@dyocore.com)  
>  
> [www.dyocore.com](http://www.dyocore.com)  
>  
>  
>

> From: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
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> Mike Bergey  
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> Tel: 405-364-4212  
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> E-mail: [mbergey@bergey.com](mailto:mbergey@bergey.com)  
> <<mailto:mbergey%40bergey.com>>  
> Web Site: [www.bergey.com](http://www.bergey.com)  
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> =====  
> THANK YOU FOR PARTICIPATING IN THE HOME ENERGY LIST.  
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- > [small-wind-home-fullfeatured@yahogroups.com](mailto:small-wind-home-fullfeatured@yahogroups.com)
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— — — — —

**Subject:** [s-w-h] Re: Article on DyoCore  
**From:** Doug (doug@selsam.com)  
**To:** small-wind-home@yahoogroups.com;  
**Date:** Tuesday, March 22, 2011 9:30 AM

---

I feel compelled to stand up and state the obvious here:

1) This turbine falls into the same exact category as so many others who have "crashed" this list, claiming to make more power than is even contained in a given wind, etc.

2) We should construct a list of these turbines in sequence, as they all make similar claims, and always end up going away with tail between legs: How 'bout Alex Kollitz [www.nexwindenergy.com](http://www.nexwindenergy.com)? Remember how vehement he was? Over the top! Where is their "superior machine" today? Looks like the domain has gone into "parked" mode... When I google Nexwindenergy, the only link I pick up goes to my own site [whyareyousolame.com](http://whyareyousolame.com) wherein I started exposing these scam turbines but got bored with it.

3) I guarantee Mike Bergey does NOT feel threatened by Dyocore, in the sense of product comparison. Where everyone SHOULD feel threatened is that this baseball game has a new player who does not understand a "force out" which is what happens when new turbine manufacturers come onto the scene exaggerating output to impossible levels. Why does Mike Bergey NOT feel threatened by Dyocore? because Mike knows that Mother Nature will do the job of sorting out the winners and losers.

4) How 'bout Windtree? Remember how long they were kicking and screaming about their superior output? Where is one of theirs today? We need a list of these.

4) Why exactly is it called "Dyocore"? Is it something about the "core" that is "Dyo"?

5) Video of a 5-foot diameter turbine hitting 4-5 kW showing meters - (could definitely not be accomplished using only 1 rotor).

Doug Selsam

PS: How windy was it the other day Doug? We lost a fence: the steel poles were bent over. Lost a few concrete roof times too.

--- In small-wind-home@yahoogroups.com, "David" <dave@...> wrote:  
>

**Exhibit 65**

> It's very unfortunate Mr. Bergey feels very threatened by DyoCore. I regret  
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> We are working aggressively with many industry leaders in making Small Wind  
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>

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> To learn more about DyoCore, [www.dyocore.com](http://www.dyocore.com)

>

>

>

> Best wishes,

>

>

>

> David Raine

>

> dave@...  
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> Fax: 405-364-2078  
> E-mail: mbergey@... <mailto:mbergey%40bergey.com>  
> Web Site: www.bergey.com  
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---

**Subject:** Re: [s-w-h] Article on DyoCore  
**From:** Nando (nando37@tx.rr.com)  
**To:** dave@dyocore.com; small-wind-home@yahoogroups.com;  
**Date:** Tuesday, March 22, 2011 10:51 AM

---

David:

Again I ask, and again I ask, why do you NOT address the constant and many messages about the Physical laws your wind mill is defying.

Why your response is always around the wind mill but never on the wind mill specifically ?.

The Kinetic energy a wind mill can harvest is defined by the air mass and velocity = volume that impinges the wind mill blades frontal area.

Please , do not encourage similar products, we are too few to show the non technical people ( THE USERS) that the product is a Scam.---

I dare you to take the offer that RandyLane\_pilot@yahoo.com has presented, or at least to prove the world wind mill community wrong, place the wind mill in a certified site that has the data available to examine clearly un-altered .

Many of us will believe that such demonstration will be not be available -- EVER !!

Nando

----- Original Message -----

From: David

To: 'Michael Klemen' ; small-wind-home@yahoogroups.com

Sent: Monday, March 21, 2011 6:53 PM

Subject: RE: [s-w-h] Article on DyoCore

Exhibit 66

Hi Michael, hope you are well. Yes I answered your questions and posted the information directly to our site. As I mentioned I try to stay away from this blog as it has taken a wrong direction. A forum towards education and development support would be a stronger approach.

If our product was installed on a 100 foot pole with a similar wind diameter to a larger system it would perform exactly like other available turbines and the only additional cost would be the pole and larger blades. Still placing the price considerably less than the comparison. Our motor can be configured for a wide range of performance expectations. This is a very simple accomplishment in changing the windings and poles to meet your expectations. Our blade size and application appear to be the contention.

To address cost would be wrong as our turbine retails for only \$1800. This is the amongst the lowest cost solutions in the market and backed 100% by us. There are very few comparable products on the market.

Our target however is the residential market, not remote farmers or large property owners. Our product applies to a much broader spectrum and is sold all over the world. CA is a very small market for us in comparison. Yes we have only been developing since 2004 but we are self-funded and have taken no government funding. This additionally is something most turbine manufacturers cannot say though I'm not indicating this is a specific benefit other than it demonstrates our integrity. We did not develop our product around a program and had no idea the CEC program existed a few years ago.

We cannot simply dismiss the potential of low wind just because it is not very efficient today, this will change and regardless of the CEC rebate or any federal program we are working hard to encourage the development of greater efficiencies and products within this space. We have accomplished a lot in just this last year alone. The quality of our product and our motor performance is solid, it was designed for lower wind conditions. Yes with a smaller blade diameter we are limited to the mathematical potential of the available wind torque, but these numbers show a lot of promise in making small wind a real solution for the majority opposed to the few.

We are working with the SWCC towards certification. We are more importantly working with complete independent companies and direct reporting of systems on actual homes over the next year that will be readily available directly

from our site. Both the good and the bad. For the past year we have been reaching out to be more involved within the community and to encourage similar product, applications and development.

From: small-wind-home@yahoogroups.com  
[mailto:small-wind-home@yahoogroups.com] On Behalf Of Michael Klemen  
Sent: Monday, March 21, 2011 10:19 AM  
To: small-wind-home@yahoogroups.com  
Subject: RE: [s-w-h] Article on DyoCore

David,

I have to totally disagree with you on Mike Bergey's professionalism. In my opinion, it is you that has shown no restraint and lack of professionalism.

Mike Bergey is not threatened by DyoCore. It is the entire small wind industry that he has been part of for decades that is threatened. When a product that cannot deliver on its promises is sold, that makes all similar products look bad. When that product is purchased with taxpayer money, it makes the entire industry look bad. DyoCore wasn't in business back in the '80's (I think) when Federal Tax money was spent on small wind energy. The aftermath of those first subsidies nearly destroyed the industry.

David, you and I carried on a private conversation about DyoCore's turbine and the lack of quality data and how out of sorts your web site is with reality. It was absolutely clear to me that DyoCore really doesn't know what they're doing with performance measurement. You never addressed the discrepancies in the data that I pointed out. You only wanted me to come to your site and see one in action. Seeing one in action doesn't change anything. Based on all of the data that Dyocore made available, there is no need for me to come to your site. DyoCore needs to learn more and get their message to be consistent with reality. Some of the comments on the article are exactly the same things that I said to you.

Here's something DyoCore can do. Get this turbine certified by the SWCC. That will separate the wheat from the chaff, and we'll see where things stand. I'll get off my soap box. I promise. In fact, I bet Mike Bergey and everybody else will quit complaining about DyoCore. Why? Because the issues with the data will be addressed by the certification. DyoCore would then be held accountable for its marketing materials - and they would then be comparable to every other certified turbine in the industry.

It's sad to me that with so many people explaining such basic things about wind energy to DyoCore, that it's been totally ignored. There are people in the industry that know what they're talking about - if DyoCore would only listen.

I understand DyoCore wants to believe in themselves and their product, but there should come a time even in the believer's mind that a good reality check is not a bad thing. It could save a lot of effort, a lot of money, some credibility, and maybe even a company.

Lastly, I'll quote you: "If anyone would like to take a more formal approach to learning about DyoCore, our vision, objectives and development"

I'd like so see DyoCore take a formal approach to providing the correct facts about it's turbine. Marketing should be 2nd place to factual information.

Sincerely,  
Mike Klemen

--- On Mon, 3/21/11, David <dave@dyocore.com <mailto:dave%40dyocore.com> > wrote:

> From: David <dave@dyocore.com <mailto:dave%40dyocore.com> >  
> Subject: RE: [s-w-h] Article on DyoCore  
> To: "Mike Bergey" <mbergey@bergey.com <mailto:mbergey%40bergey.com> >, small-wind-home@yahoogroups.com <mailto:small-wind-home%40yahoogroups.com>  
> Date: Monday, March 21, 2011, 7:45 AM

- > It's very unfortunate Mr. Bergey
- > feels very threatened by DyoCore. I regret
- > he has not shown any professionalism or restraint.
- > His stance is bias
- > against low wind and even more bias against products that
- > demonstrate how
- > overpriced his own product is in
- > comparison. If anyone would like to take
- > a more formal approach to learning about DyoCore, our
- > vision, objectives and
- > development please contact me directly at anytime. We
- > have worked very hard
- > over these past several years to make small wind
- > affordable, practical and
- > reliable for the average homeowner. It is not a small
- > accomplishment and we
- > have a long way to go.
- >
- >
- >
- > DyoCore has a great relationship with the CEC and is
- > working with the CEC to
- > hopefully qualify installations of our product in the
- > future. Unfortunately
- > products like Bergy only represent less than 1% of all
- > Californians in
- > possibly of application and less than maybe a tenth of that
- > in
- > affordability. Until SolAir the average
- > homeowner, who also funds the
- > program, couldn't afford or get permitting for a
- > solution. Over the past
- > year we have changed this dramatically and now allow the
- > program to
- > represent a significantly broader base of the very
- > residents that fund the
- > program. It's our goal within the next year to double
- > that list.
- >
- >
- >

> We are working aggressively with many industry leaders in  
> making Small Wind  
> a very real and viable solution. DyoCore has  
> accomplished more than any  
> other wind manufacturer in CA, hopefully with greater  
> resources and  
> professional assistance we can continue to make small wind  
> a real solution.

>

>

>

> To learn more about DyoCore, [www.dyocore.com](http://www.dyocore.com)

>

>

>

> Best wishes,

>

>

>

> David Raine

>

> [dave@dyocore.com](mailto:dave@dyocore.com) <<mailto:dave%40dyocore.com>>

>

> [www.dyocore.com](http://www.dyocore.com)

>

>

>

> From: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
<<mailto:small-wind-home%40yahoogroups.com>>

> [<mailto:small-wind-home@yahoogroups.com>  
<<mailto:small-wind-home%40yahoogroups.com>> ]

> On Behalf Of Mike Bergey

> Sent: Monday, March 21, 2011 4:17 AM

> To: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
<<mailto:small-wind-home%40yahoogroups.com>>

> Subject: [s-w-h] Article on DyoCore

>

>

>

>

>



> We've discussed DyoCore on this listserv. The following  
> article covers  
> DyoCore's crashing the CEC rebate program. Be sure to read  
> the comments.

>  
>

[http://www.greentechmedia.com/articles/read/have-small-wind-manufacturers-ex  
> ploited-loop-holes-in-california-rebates/](http://www.greentechmedia.com/articles/read/have-small-wind-manufacturers-exploited-loop-holes-in-california-rebates/)

>

> I believe there's a follow-on article in the works.

>

> Mike Bergey

> President

> Bergey Windpower Co.

> 2200 Industrial Blvd.

> Norman, OK 73069 USA

> Tel: 405-364-4212

> Fax: 405-364-2078

> E-mail: [mbergey@bergey.com](mailto:mbergey@bergey.com) <<mailto:mbergey%40bergey.com>>

> <<mailto:mbergey%40bergey.com>>

> Web Site: [www.bergey.com](http://www.bergey.com)

>

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> [Non-text portions of this message have been removed]

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> . Please feel free to send your input to:

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> <http://www.ndsu.nodak.edu/ndsu/klemen> .  
>  
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  or stop receiving the list by e-mail

(and read it on the Web), go to

<http://www.yahogroups.com/list/small-wind-home> .

. An FAQ on small wind systems is located at

<http://www.ndsu.nodak.edu/ndsu/klemen> .

---

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(Yahoo! ID required)

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[small-wind-home-digest@yahogroups.com](mailto:small-wind-home-digest@yahogroups.com)

[small-wind-home-fullfeatured@yahogroups.com](mailto:small-wind-home-fullfeatured@yahogroups.com)

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**Subject:** Re: [s-w-h] CEC suspension  
**From:** Michael Klemen (wind4energy@yahoo.com)  
**To:** small-wind-home@yahoogroups.com;  
**Date:** Wednesday, March 23, 2011 12:51 PM

Dan,

Your points are part of the stuff I talked with David about in a private conversation a month and a half ago.

You aren't the one doing the fuzzy math here.

The installation and the data don't jive at all. They make an interesting pass at the IEC standards in that document you referenced, however the basis for their data collection is entirely WRONG. They don't even have it on a site that would qualify for testing to the standards. That's the first egregious error that makes everything after that totally flawed. I explained it, and DyoCore doesn't care. But to the unknowledgeable consumer, it sure looks like a great paper.

Mike

--- On Wed, 3/23/11, buckvillian <danb@otherpower.com> wrote:

> From: buckvillian <danb@otherpower.com>  
> Subject: Re: [s-w-h] CEC suspension  
> To: small-wind-home@yahoogroups.com  
> Date: Wednesday, March 23, 2011, 12:37 PM  
> I really should get to work but I  
> cannot help to add a bit more. I fret way too much  
> about this small wind fantasy stuff, it keeps me up at night  
> sometimes.  
>

Exhibit 67

> >  
> > It is not appropriate to try to leverage the CEC  
> program to sustain your  
> > business.  
>  
> Nor is it appropriate to dishonestly rate small turbines  
> and lie about the performance. I've just been looking  
> at the dyocore site a bit more and the .pdf that talks about  
> actual installations and their performance. You folks  
> either have really badly calibrated meters or you're just  
> plain pulling numbers out of the air on this page:  
> [http://www.dyocore.com/material/IEC\\_Standard\\_61400-SolAir.pdf](http://www.dyocore.com/material/IEC_Standard_61400-SolAir.pdf)  
> Or you've figured out some magic and if those power curves  
> and 'actual measured' energy production figures are even  
> half true... I want one of these machines!!! But I  
> don't believe a word of it.  
>  
> > This presents quite a few problems and one of  
> which everyone is  
> > pointing a finger at DyoCore. We have thrived  
> before the rebate program and  
> > will do quite well after it.  
>  
> Anybody that tells folks what they 'want' to hear will  
> thrive (at least until the customers come back to bite,  
> which I hope they do in this case).  
>  
> > The solution is education towards applicable  
> > wind conditions and the equipment applied to those  
> conditions.  
>  
> We agree 100% on that bit.  
> >  
>  
> > Companies like DyoCore will sustain long after any  
> rebate program due to  
> > demand of a solution that works for everyone, not one  
> limited to a very very  
> > small few.  
>  
> There is no small wind solution that works for everyone...

- > but if you imply that there is, yes... I'm sure you can part
- > lots of folks from their hard earned dollars and in some
- > cases the government out of my tax dollars, which I hate to
- > see wasted on this stuff.
- >
- >>
- >> I encourage you to develop products that meet the
- > market demand.
- >
- > I think you should be encouraged to develop products that
- > produce real energy that is cost effective. If you
- > really believe in this 'green' stuff, then you should be
- > concerned that valuable resources are not wasted. You
- > should be concerned that the 'people' have a realistic
- > understanding of wind energy. Be part of the solution,
- > not the problem.
- >
- > You keep saying the testing has been done - real results
- > are in. I expect you are talking of this pdf: [http://www.dyocore.com/material/IEC\\_Standard\\_61400-SolAir.pdf](http://www.dyocore.com/material/IEC_Standard_61400-SolAir.pdf)
- >
- > Real quick... some math (correct me if I'm wrong). In
- > 'figure 3' dyocore talks about cP.
- >  $P = .5 \times \rho \times A \times V^3 \times cP$
- > P is Watts
- >  $\rho$  (at sea level which you have corrected for =
- >  $1.23 \text{ kg/m}^3$ )
- >  $A = m^2$ , in this case, for dyocore 1.13
- >  $V = \text{meters/sec}$
- > I'll plug in Betz for cP (.593)
- > so real quick lets go pick 2 of the data points.
- >
- > At 3.6 meters/sec (8.1mph), best you can do is 19 Watts.
- > Figure 3 claims .41kW, or 410 Watts
- > So beating the laws of physics just slightly by about
- > 2158%
- >
- > On the high end, 8.8m/s (or 19.6mph)
- > Figure 3 claims the output of the machine to be 1600
- > Watts.
- > Betz says a perfect wind turbine the size of dyocore could



> do 279 Watts.  
> So at this speed the claimed output is slightly more  
> realistic, only beating the laws of physics by about 573%,  
>  
> Is my math off, or is there a serious problem here?  
> It is absolutely fair for any company that is clearly in  
> competition with this sort of fantasy to complain loudly  
> about it. It should be absolutely fair for any  
> customer who buys a product based on such false stuff to  
> demand their money back + some for wasted time and punitive  
> damages in my opinion.

>  
>  
>>  
>>  
>>  
>> From: small-wind-home@yahoogroups.com  
>> [mailto:small-wind-home@yahoogroups.com]  
> On Behalf Of hgengineer  
>> Sent: Tuesday, March 22, 2011 10:23 PM  
>> To: small-wind-home@yahoogroups.com  
>> Subject: [s-w-h] CEC suspension

>>  
>>  
>>  
>>  
>>  
>>  
>>  
>> Hello all,

>>  
>> I'm developing a power point to address the CEC's  
> suspension of the emerging  
>> renewables program. Hopefully, this can speed up the  
> process, because the  
>> suspension has almost halted new business.  
>> (Thank you very much, Dyocore.)  
>>  
>> I've developed some key points in the  
> presentation(some listed below). If  
>> you have any additional comments or suggestions, feel

> free to respond.  
> >  
> > The Problem  
> >  
> > > Turbine manufacturers claiming unreal production  
> values (E.G. Dyocore)  
> > > Turbines that constantly are plagued with failures  
> and long shipment dates.  
> > (E.G. Redriven, Century wind, etc.)  
> > > Turbine manufacturers and installers claiming  
> you'll "get your system  
> installed for \$1".  
> > > Turbine manufacturers and installers siting wind  
> systems in ridiculous  
> locations.  
> > (E.G. on roofs, near trees, some even on a measly 12'  
> "poles")  
> >  
> > Revisions  
> >  
> > > Mandate that ALL CEC eligible turbines(that  
> haven't done so already)  
> > complete an approved two year duration test that  
> monitors power  
> > production/Structural integrity, wear and tear.  
> >  
> > > Mandate 30 meter wind data logging within "X"  
> miles of proposed turbine  
> > sites. We can't be reliant on 80 meter wind maps,  
> every site is different.  
> >  
> > > Base rebate payments on VALIDATED power outputs at  
> 25 mph(11m/s) wind  
> > speed.  
> > (Ex. Bergey produces 8200 watts @ 25 MPH, so \$24,600  
> rebate.  
> > Xzeres produces 10,000 watts @ 25 MPH, so \$30,000  
> rebate.)  
> >  
> > > Require remediation by fraudulent turbine  
> companies.

> > (Ahem, Dyocore...)  
> >  
> > > Ban ALL roof mounted turbines. (please, who can  
> expect a nice, constant  
> > flow of air right next to a jutting eave?)  
> >  
> > > Ban ANY turbine installation in areas where  
> average wind speed falls below  
> > "X" MPH. Solar would be the logical choice, wind  
> turbines aren't meant to be  
> > yard ornaments.  
> >  
> > > Extend \$3.00 per Watt rebate another year. With  
> the money now saved, why  
> > not?  
> >  
> > > Require warranty insurance for turbine companies  
> under 3 years old.  
> > (If we want a good name for our industry, we need to  
> protect the consumer.)  
> >  
> > -Hunter Gasca  
> >  
> > Tech  
> >  
> > S.G.E.I.  
> > Tel:(760) 885-9862  
> > Hgengineer@... <mailto:Hgengineer%40gmail.com>  
> >  
> > SoCalWindandSolar.com  
> >  
> >  
> >  
> >  
> >  
> >  
> > [Non-text portions of this message have been removed]  
> >  
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> -----  
>  
> =====  
> THANK YOU FOR PARTICIPATING IN THE HOME ENERGY LIST.  
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> . Please feel free to send your input to:  
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> . To view previous messages from the list,  
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> or stop receiving the list by e-mail  
> (and read it on the Web), go to  
> <http://www.yahoogroups.com/list/small-wind-home> .  
>  
> . An FAQ on small wind systems is located at  
> <http://www.ndsu.nodak.edu/ndsu/klemen> .  
>  
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<http://www.yahogroups.com/list/small-wind-home> .  
An FAQ on small wind systems is located at  
<http://www.ndsu.nodak.edu/ndsu/klemen> .

---

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(Yahoo! ID required)
- <\*> To change settings via email:  
[small-wind-home-digest@yahogroups.com](mailto:small-wind-home-digest@yahogroups.com)  
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- <\*> Your use of Yahoo! Groups is subject to:  
<http://docs.yahoo.com/info/terms/>

**Subject:** Re: [s-w-h] CEC suspension  
**From:** hgengineer (hgengineer@yahoo.com)  
**To:** small-wind-home@yahoogroups.com;  
**Date:** Wednesday, March 23, 2011 1:26 PM

---

No sir, what isn't appropriate is how your company has helped slow down not only my business, but all the other reputable installers/manufacturers like Gausti const. and Xzeres, to name a few.

And you're right, i'm leveraging the CEC to improve not only my business, but the hundreds of other reputable small wind installers/manufacturers in California. I'm stating the facts, something which you and your company seem to have a hard time doing.

Perhaps if your product obeyed the laws of physics and wasn't mounted in such horrible conditions, you wouldn't have the small wind industry on your tail and people pointing fingers.

-Hunter

--- In small-wind-home@yahoogroups.com, "David" <dave@...> wrote:

- >
- > It is not appropriate to try to leverage the CEC program to sustain your
- > business. This presents quite a few problems and one of which everyone is
- > pointing a finger at DyoCore. We have thrived before the rebate program and
- > will do quite well after it. The solution is education towards applicable
- > wind conditions and the equipment applied to those conditions.
- >
- >
- >
- > It is unfortunate that a very few "manufacturers" have taken such a stance

**Exhibit 68**



> towards the suspension of the program. This is a great opportunity for the  
> industry to re-address applicable conditions in which an appropriate turbine  
> might apply.

>

>

>

> Companies like DyoCore will sustain long after any rebate program due to  
> demand of a solution that works for everyone, not one limited to a very very  
> small few. This inevitable will lead to greater resources towards  
> applicable solutions and low wind efficiency improvement.

>

>

>

> I encourage you to develop products that meet the market demand.

>

>

>

> From: small-wind-home@yahoogroups.com

> [mailto:small-wind-home@yahoogroups.com] On Behalf Of hgengineer

> Sent: Tuesday, March 22, 2011 10:23 PM

> To: small-wind-home@yahoogroups.com

> Subject: [s-w-h] CEC suspension

>

>

>

>

>

>

>

> Hello all,

>

> I'm developing a power point to address the CEC's suspension of the emerging  
> renewables program. Hopefully, this can speed up the process, because the  
> suspension has almost halted new business.

> (Thank you very much, Dyocore.)

>

> I've developed some key points in the presentation(some listed below). If  
> you have any additional comments or suggestions, feel free to respond.

>

> The Problem

>

- > >Turbine manufacturers claiming unreal production values (E.G.Dyocore)
- > >Turbines that constantly are plagued with failures and long shipment dates.
- > (E.G. Redriven, Century wind, etc.)
- > >Turbine manufacturers and installers claiming you'll "get your system
- > installed for \$1".
- > >Turbine manufacturers and installers siting wind systems in ridiculous
- > locations.
- > (E.G. on roofs, near trees, some even on a measly 12' "poles")
- >
- > Revisions
- >
- > >Mandate that ALL CEC eligible turbines(that haven't done so already)
- > complete an approved two year duration test that monitors power
- > production/Structural integrity, wear and tear.
- >
- > >Mandate 30 meter wind data logging within "X" miles of proposed turbine
- > sites. We can't be reliant on 80 meter wind maps, every site is different.
- >
- > >Base rebate payments on VALIDATED power outputs at 25 mph(11m/s) wind
- > speed.
- > (Ex. Bergey produces 8200 watts @ 25 MPH, so \$24,600 rebate.
- > Xzeres produces 10,000 watts @ 25 MPH, so \$30,000 rebate.)
- >
- > >Require remediation by fraudulent turbine companies.
- > (Ahem, Dyocore...)
- >
- > >Ban ALL roof mounted turbines. (please, who can expect a nice, constant
- > flow of air right next to a jutting eave?)
- >
- > >Ban ANY turbine installation in areas where average wind speed falls below
- > "X" MPH. Solar would be the logical choice, wind turbines aren't meant to be
- > yard ornaments.
- >
- > >Extend \$3.00 per Watt rebate another year. With the money now saved, why
- > not?
- >
- > >Require warranty insurance for turbine companies under 3 years old.
- > (If we want a good name for our industry, we need to protect the consumer.)
- >
- > -Hunter Gasca
- >

> Tech  
>  
> S.G.E.I.  
> Tel:(760) 885-9862  
> Hgengineer@... <mailto:Hgengineer%40gmail.com>  
>  
> SoCalWindandSolar.com  
>  
>  
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>  
>  
> [Non-text portions of this message have been removed]  
>

---

## THANK YOU FOR PARTICIPATING IN THE HOME ENERGY LIST.

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---

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**Subject:** RE: [s-w-h] Article on DyoCore  
**From:** Michael Klemen (wind4energy@yahoo.com)  
**To:** small-wind-home@yahoogroups.com; dave@dyocore.com;  
**Date:** Sunday, March 27, 2011 9:18 AM

---

David,

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[http://www.smallwindcertification.org/certified\\_turbines.html](http://www.smallwindcertification.org/certified_turbines.html)

It does not show the DyoCore wind turbine to even be in a pending status with the SWCC. In your response to my email you stated:

"We are working with the SWCC towards certification."

So, can you explain what you meant when you're working with the SWCC towards certification? It doesn't appear that DyoCore has even applied.

Thanks,  
Mike

From: small-wind-home@yahoogroups.com [mailto:small-wind-home@yahoogroups.com] On Behalf Of Michael Klemen  
Sent: Monday, March 21, 2011 10:19 AM  
To: small-wind-home@yahoogroups.com  
Subject: RE: [s-w-h] Article on DyoCore David,

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Mike Bergey is not threatened by DyoCore. It is the entire small wind industry that he has been part of for decades that is threatened. When a product that

**Exhibit 69**

cannot deliver on its promises is sold, that makes all similar products look bad. When that product is purchased with taxpayer money, it makes the entire industry look bad. DyoCore wasn't in business back in the '80's (I think) when Federal Tax money was spent on small wind energy. The aftermath of those first subsidies nearly destroyed the industry.

David, you and I carried on a private conversation about DyoCore's turbine and the lack of quality data and how out of sorts your web site is with reality. It was absolutely clear to me that DyoCore really doesn't know what they're doing with performance measurement. You never addressed the discrepancies in the data that I pointed out. You only wanted me to come to your site and see one in action. Seeing one in action doesn't change anything. Based on all of the data that Dyocore made available, there is no need for me to come to your site. DyoCore needs to learn more and get their message to be consistent with reality. Some of the comments on the article are exactly the same things that I said to you.

Here's something DyoCore can do. Get this turbine certified by the SWCC. That will separate the wheat from the chaff, and we'll see where things stand. I'll get off my soap box. I promise. In fact, I bet Mike Bergey and everybody else will quit complaining about DyoCore. Why? Because the issues with the data will be addressed by the certification. DyoCore would then be held accountable for its marketing materials - and they would then be comparable to every other certified turbine in the industry.

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I understand DyoCore wants to believe in themselves and their product, but there should come a time even in the believer's mind that a good reality check is not



a bad thing. It could save a lot of effort, a lot of money, some credibility, and maybe even a company.

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I'd like so see DyoCore take a formal approach to providing the correct facts about it's turbine. Marketing should be 2nd place to factual information.

Sincerely,  
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> Subject: RE: [s-w-h] Article on DyoCore  
> To: "Mike Bergey" <mbergey@bergey.com>, small-wind-home@yahoogroups.com  
> Date: Monday, March 21, 2011, 7:45 AM  
> It's very unfortunate Mr. Bergey  
> feels very threatened by DyoCore. I regret  
> he has not shown any professionalism or restraint.  
> His stance is bias  
> against low wind and even more bias against products that  
> demonstrate how  
> overpriced his own product is in  
> comparison. If anyone would like to take  
> a more formal approach to learning about DyoCore, our  
> vision, objectives and  
> development please contact me directly at anytime. We  
> have worked very hard  
> over these past several years to make small wind  
> affordable, practical and  
> reliable for the average homeowner. It is not a small  
> accomplishment and we  
> have a long way to go.  
>  
>  
>  
> DyoCore has a great relationship with the CEC and is

> working with the CEC to  
> hopefully qualify installations of our product in the  
> future. Unfortunately  
> products like Bergy only represent less than 1% of all  
> Californians in  
> possibly of application and less than maybe a tenth of that  
> in  
> affordability. Until SolAir the average  
> homeowner, who also funds the  
> program, couldn't afford or get permitting for a  
> solution. Over the past  
> year we have changed this dramatically and now allow the  
> program to  
> represent a significantly broader base of the very  
> residents that fund the  
> program. It's our goal within the next year to double  
> that list.  
>  
>  
>  
> We are working aggressively with many industry leaders in  
> making Small Wind  
> a very real and viable solution. DyoCore has  
> accomplished more than any  
> other wind manufacturer in CA, hopefully with greater  
> resources and  
> professional assistance we can continue to make small wind  
> a real solution.  
>  
>  
>  
> To learn more about DyoCore, [www.dyocore.com](http://www.dyocore.com)  
>  
>  
>  
> Best wishes,  
>  
>  
>  
> David Raine  
>

> dave@dyocore.com  
>  
> www.dyocore.com  
>  
>  
>  
> From: small-wind-home@yahoogroups.com  
> [mailto:small-wind-home@yahoogroups.com]  
> On Behalf Of Mike Bergey  
> Sent: Monday, March 21, 2011 4:17 AM  
> To: small-wind-home@yahoogroups.com  
> Subject: [s-w-h] Article on DyoCore  
>  
>  
>  
>  
> We've discussed DyoCore on this listserv. The following  
> article covers  
> DyoCore's crashing the CEC rebate program. Be sure to read  
> the comments.  
>  
> [http://www.greentechmedia.com/articles/read/have-small-wind-manufacturers-ex](http://www.greentechmedia.com/articles/read/have-small-wind-manufacturers-exploited-loop-holes-in-california-rebates/)  
> [ploited-loop-holes-in-california-rebates/](http://www.greentechmedia.com/articles/read/have-small-wind-manufacturers-exploited-loop-holes-in-california-rebates/)  
>  
> I believe there's a follow-on article in the works.  
>  
> Mike Bergey  
> President  
> Bergey Windpower Co.  
> 2200 Industrial Blvd.  
> Norman, OK 73069 USA  
> Tel: 405-364-4212  
> Fax: 405-364-2078  
> E-mail: mbergey@bergey.com  
> <mailto:mbergey%40bergey.com>  
> Web Site: www.bergey.com  
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> [Non-text portions of this message have been removed]  
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> =====  
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(and read it on the Web), go to  
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<http://docs.yahoo.com/info/terms/>

**Subject:** Re: [s-w-h] Article on DyoCore

**From:** David Raine (dave@dyocore.com)

**To:** wind4energy@yahoo.com;

**Date:** Sunday, March 27, 2011 11:49 AM

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This blog is continuing to be more of a complaint box than a resolution to the problems the industry faces. Maybe a better focus would be to use all this talent to create a formal process and guidelines. A basic consumer guide. One that provides education for both sides.

There are plenty of good products on the market, but all have their problems, some cost, some performance, some mgf support, and some permitting. Matching a turbine to your specific needs is a mind bending task but one that could be simplified with some guidance.

At DyoCore we would like to be part of a process that provides solutions and education to the consumers, I would personally be very happy to assist towards this direction.

David Raine  
760-580-4271

On Mar 27, 2011, at 7:18 AM, Michael Klemen <wind4energy@yahoo.com> wrote:

| David,

**Exhibit 70**



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**Sent:** Monday, March 21, 2011 10:19 AM  
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**Subject:** RE: [s-w-h] Article on DyoCore

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> To: "Mike Bergey" <mbergey@bergey.com>, small-wind-home@yahooogroups.com  
> Date: Monday, March 21, 2011, 7:45 AM  
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> that list.  
>  
>  
>  
> We are working aggressively with many industry leaders in  
> making Small Wind  
> a very real and viable solution. DyoCore has  
> accomplished more than any  
> other wind manufacturer in CA, hopefully with greater  
> resources and  
> professional assistance we can continue to make small wind  
> a real solution.  
>  
>  
>  
> To learn more about DyoCore, [www.dyocore.com](http://www.dyocore.com)  
>  
>  
>  
> Best wishes,  
>  
>  
>  
> David Raine  
>  
> [dave@dyocore.com](mailto:dave@dyocore.com)  
>  
> [www.dyocore.com](http://www.dyocore.com)  
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> [ploited-loop-holes-in-california-rebates/](http://www.greentechmedia.com/articles/read/have-small-wind-manufacturers-exploited-loop-holes-in-california-rebates/)  
>  
> I believe there's a follow-on article in the works.  
>  
> Mike Bergey  
> President  
> Bergey Windpower Co.  
> 2200 Industrial Blvd.  
> Norman, OK 73069 USA  
> Tel: 405-364-4212  
> Fax: 405-364-2078  
> E-mail: mbergey@bergey.com  
> <mailto:mbergey%40bergey.com>  
> Web Site: www.bergey.com  
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or stop receiving the list by e-mail  
(and read it on the Web), go to  
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An FAQ on small wind systems is located at  
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---

---

**Subject:** Re: [s-w-h] Article on DyoCore

---

**From:** Michael Klemen (wind4energy@yahoo.com)

**To:** dave@dyocore.com;

**Date:** Sunday, March 27, 2011 11:53 AM

---

Dave,

Please post to the discussion list. I have some answers for you.

Mike

--- On Sun, 3/27/11, David Raine <dave@dyocore.com> wrote:

From: David Raine <dave@dyocore.com>  
Subject: Re: [s-w-h] Article on DyoCore  
To: "Michael Klemen" <wind4energy@yahoo.com>  
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**Exhibit 71**

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At DyoCore we would like to be part of a process that provides solutions and education to the consumers, I would personally be very happy to assist towards this direction.

David Raine  
760-580-4271

On Mar 27, 2011, at 7:18 AM, Michael Klemen <[wind4energy@yahoo.com](mailto:wind4energy@yahoo.com)> wrote:

David,

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[http://www.smallwindcertification.org/certified\\_turbines.html](http://www.smallwindcertification.org/certified_turbines.html)

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"We are working with the SWCC towards certification."

So, can you explain what you meant when you're working with the SWCC towards certification? It doesn't appear that DyoCore has even applied.

Thanks,  
Mike

---

**From:** [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com) [mailto:[small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)] **On Behalf Of** Michael Klemen  
**Sent:** Monday, March 21, 2011 10:19 AM  
**To:** [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
**Subject:** RE: [s-w-h] Article on DyoCore

David,

I have to totally disagree with you on Mike Bergey's professionalism. In my opinion, it is you that has shown no restraint and lack of professionalism.

Mike Bergey is not threatened by DyoCore. It is the entire small wind industry that he has been part of for decades that is threatened. When a product that cannot deliver on its promises is sold, that makes all similar products look bad. When that product is purchased with taxpayer money, it makes the entire industry look bad. DyoCore wasn't in business back in the '80's (I think) when Federal Tax money was spent on small wind energy. The aftermath of those first subsidies nearly destroyed the industry.

David, you and I carried on a private conversation about DyoCore's turbine and the lack of quality data and how out of sorts your web site is with reality. It was absolutely clear to me that DyoCore really doesn't know what they're doing with performance measurement. You never addressed the discrepancies in the data that I pointed out. You only wanted me to come to your site and see one in action. Seeing one in action doesn't change anything. Based on all of the data that Dyocore made available, there is no need for me to come to your site. DyoCore needs to learn more and get their message to be consistent with reality. Some of the comments on the article are exactly the same things that I said to you.

Here's something DyoCore can do. Get this turbine certified by the SWCC. That will separate the wheat from the chaff, and we'll see where things stand. I'll get off my soap box. I promise. In fact, I bet Mike Bergey and everybody else will quit complaining about DyoCore. Why? Because the issues with the data will be addressed by the certification. DyoCore would then be held accountable for its marketing materials - and they would then be comparable to every other certified turbine in the industry.

It's sad to me that with so many people explaining such basic things about wind energy to DyoCore, that it's been totally ignored. There are people in the industry that know what they're talking about - if DyoCore would only listen.

I understand DyoCore wants to believe in themselves and their product, but there should come a time even in the believer's mind that a good reality check is not a bad thing. It could save a lot of effort, a lot of money, some credibility, and maybe even a company.

Lastly, I'll quote you: "If anyone would like to take a more formal approach to learning about DyoCore, our vision, objectives and development"

I'd like so see DyoCore take a formal approach to providing the correct facts about it's turbine. Marketing should be 2nd place to factual information.

Sincerely,  
Mike Klemen

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> From: David <dave@dyocore.com>  
> Subject: RE: [s-w-h] Article on DyoCore  
> To: "Mike Bergey" <mbergey@bergey.com>, small-wind-home@yahoogroups.com  
> Date: Monday, March 21, 2011, 7:45 AM  
> It's very unfortunate Mr. Bergey  
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> His stance is bias  
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>  
>  
>  
> We are working aggressively with many industry leaders in  
> making Small Wind  
> a very real and viable solution. DyoCore has  
> accomplished more than any  
> other wind manufacturer in CA, hopefully with greater  
> resources and  
> professional assistance we can continue to make small wind  
> a real solution.  
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> To learn more about DyoCore, [www.dyocore.com](http://www.dyocore.com)  
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> Best wishes,  
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>  
>  
> David Raine  
>  
> [dave@dyocore.com](mailto:dave@dyocore.com)  
>  
> [www.dyocore.com](http://www.dyocore.com)  
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>  
> I believe there's a follow-on article in the works.  
>  
> Mike Bergey  
> President  
> Bergey Windpower Co.  
> 2200 Industrial Blvd.  
> Norman, OK 73069 USA  
> Tel: 405-364-4212  
> Fax: 405-364-2078  
> E-mail: mbergey@bergey.com  
> <mailto:mbergey%40bergey.com>  
> Web Site: www.bergey.com  
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> [Non-text portions of this message have been removed]  
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>

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**Subject:** RE: [s-w-h] Article on DyoCore  
**From:** David Raine (dyocore@gmail.com)  
**To:** wind4energy@yahoo.com; dave@dyocore.com;  
**Date:** Sunday, March 27, 2011 12:59 PM

You are welcome to view and comment directly to our site. I would enjoy working towards productive solutions.

Sent from my Windows Phone

---

**From:** Michael Klemen  
**Sent:** Sunday, March 27, 2011 9:53 AM  
**To:** David Raine  
**Subject:** Re: [s-w-h] Article on DyoCore

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**Exhibit 72**

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> www.dyocore.com  
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>  
> I believe there's a follow-on article in the works.  
>  
> Mike Bergey  
> President  
> Bergey Windpower Co.  
> 2200 Industrial Blvd.  
> Norman, OK 73069 USA  
> Tel: 405-364-4212  
> Fax: 405-364-2078  
> E-mail: mbergey@bergey.com  
> <mailto:mbergey%40bergey.com>  
> Web Site: www.bergey.com  
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> [Non-text portions of this message have been removed]

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---

**Subject:** RE: [s-w-h] Article on DyoCore  
**From:** Michael Klemen (wind4energy@yahoo.com)  
**To:** dave@dyocore.com;  
**Date:** Sunday, March 27, 2011 2:09 PM

Davd,

You said:

"I would enjoy working towards productive solutions."

How about in the public forum so I don't have to repeat myself?

Thanks,  
Mike

---

Sent from my Windows Phone

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Mike Klemen

--- On Mon, 3/21/11, David <dave@dyocore.com> wrote:

> From: David <dave@dyocore.com>  
> Subject: RE: [s-w-h] Article on DyoCore  
> To: "'Mike Bergey'" <mbergey@bergey.com>, small-wind-home@yahoogroups.com  
> Date: Monday, March 21, 2011, 7:45 AM  
> It's very unfortunate Mr. Bergey  
> feels very threatened by DyoCore. I regret  
> he has not shown any professionalism or restraint.  
> His stance is bias  
> against low wind and even more bias against products that  
> demonstrate how  
> overpriced his own product is in  
> comparison. If anyone would like to take  
> a more formal approach to learning about DyoCore, our  
> vision, objectives and  
> development please contact me directly at anytime. We  
> have worked very hard  
> over these past several years to make small wind  
> affordable, practical and  
> reliable for the average homeowner. It is not a small  
> accomplishment and we

> have a long way to go.  
>  
>  
>  
> DyoCore has a great relationship with the CEC and is  
> working with the CEC to  
> hopefully qualify installations of our product in the  
> future. Unfortunately  
> products like Bergy only represent less than 1% of all  
> Californians in  
> possibly of application and less than maybe a tenth of that  
> in  
> affordability. Until SolAir the average  
> homeowner, who also funds the  
> program, couldn't afford or get permitting for a  
> solution. Over the past  
> year we have changed this dramatically and now allow the  
> program to  
> represent a significantly broader base of the very  
> residents that fund the  
> program. It's our goal within the next year to double  
> that list.  
>  
>  
>  
> We are working aggressively with many industry leaders in  
> making Small Wind  
> a very real and viable solution. DyoCore has  
> accomplished more than any  
> other wind manufacturer in CA, hopefully with greater  
> resources and  
> professional assistance we can continue to make small wind  
> a real solution.  
>  
>  
>  
> To learn more about DyoCore, [www.dyocore.com](http://www.dyocore.com)  
>  
>  
>  
> Best wishes,  
>  
>  
>  
> David Raine  
>  
> [dave@dyocore.com](mailto:dave@dyocore.com)  
>

5

> www.dyocore.com  
>  
>  
>  
> From: small-wind-home@yahoogroups.com  
> [mailto:small-wind-home@yahoogroups.com]  
> On Behalf Of Mike Bergey  
> Sent: Monday, March 21, 2011 4:17 AM  
> To: small-wind-home@yahoogroups.com  
> Subject: [s-w-h] Article on DyoCore  
>  
>  
>  
>  
>  
> We've discussed DyoCore on this listserv. The following  
> article covers  
> DyoCore's crashing the CEC rebate program. Be sure to read  
> the comments.  
>  
> [http://www.greentechmedia.com/articles/read/have-small-wind-manufacturers-ex-](http://www.greentechmedia.com/articles/read/have-small-wind-manufacturers-exploited-loop-holes-in-california-rebates/)  
> [ploited-loop-holes-in-california-rebates/](http://www.greentechmedia.com/articles/read/have-small-wind-manufacturers-exploited-loop-holes-in-california-rebates/)  
>  
> I believe there's a follow-on article in the works.  
>  
> Mike Bergey  
> President  
> Bergey Windpower Co.  
> 2200 Industrial Blvd.  
> Norman, OK 73069 USA  
> Tel: 405-364-4212  
> Fax: 405-364-2078  
> E-mail: mbergey@bergey.com  
> <mailto:mbergey%40bergey.com>  
> Web Site: www.bergey.com  
>  
>  
>  
>  
>  
> [Non-text portions of this message have been removed]  
>  
>  
>  
> -----  
>  
>  
>

---

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> (and read it on the Web), go to  
> <http://www.yahoogroups.com/list/small-wind-home> .  
> -----  
> . An FAQ on small wind systems is located at  
> <http://www.ndsu.nodak.edu/ndsu/klemen> .  
> -----

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>  
>  
>

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or stop receiving the list by e-mail  
(and read it on the Web), go to  
<http://www.yahoogroups.com/list/small-wind-home>  
. An FAQ on small wind systems is located at  
<http://www.ndsu.nodak.edu/ndsu/klemen>

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» «



**Subject:** RE: [s-w-h] TLG Wind Turbines, Possible Scam

**From:** Michael Klemen (wind4energy@yahoo.com)

**To:** small-wind-home@yahoogroups.com;

**Date:** Wednesday, April 6, 2011 5:42 PM

David,

This question is very easily answered. The power in the wind is:

$$P = 0.5 * \text{air density} * \text{Area} * V^3.$$

The Betz limit is 59.6% of that quantity.

For simplicity's sake, I tabulated this many years ago here:

[http://www.ndsu.edu/ndsu/klemen/Perfect\\_Turbine.htm](http://www.ndsu.edu/ndsu/klemen/Perfect_Turbine.htm)

If you go to the TLG web site for the 75" turbine

[http://www.tlgwindpower.com/images/newgen/TLG\\_1800\\_GT\\_Output.jpg](http://www.tlgwindpower.com/images/newgen/TLG_1800_GT_Output.jpg)

You see they tell us at 25 mph, they expect to get 1172 watts.

Going back to my perfect turbine page, at 25 mph, you see that the Betz limit shows 46.06 watts per square foot. Their turbine is 30.67 ft<sup>2</sup>. 46.06 x 30.67 = 1412 watts. While under Betz, it is very optimistic. A very good turbine (the last column in that graph) would perhaps get 27.3 W/ft<sup>2</sup>, or 837 watts of output.

At 15 mph, they claim to produce 254 watts, the Betz limit shows a limit of 305 watts...again, extremely optimistic because the best turbines could perhaps produce 181 watts.

While within Betz, it is entirely doubtful. Their output graph, for example, really does not show an understanding of how

**Exhibit 74**

the wind blows. The standards do not calculate energy that way. It is intended either to deceive (probably not) or simply show that they don't understand the reality of wind energy. Wind energy for a year at 30 mph is totally irrelevant for probably 99.99% of the population. And their wind energy for a year calculation is simply the energy in the wind at X mph multiplied by the time in a year. It shows nothing of a wind distribution. So in that sense, they are probably doing themselves a disservice. There will be more energy in the wind with an average wind speed of 10 mph given a wind speed distribution than the energy in a constant 10 mph wind.

You statement: "Surface area might but this could be put into the equation." Is entirely out of place. Betz has absolutely nothing to do with surface area.

Mike

--- On Wed, 4/6/11, David Raine <dave@dyocore.com> wrote:

> From: David Raine <dave@dyocore.com>  
> Subject: RE: [s-w-h] TLG Wind Turbines, Possible Scam  
> To: "'hgengineer'" <hgengineer@yahoo.com>, small-wind-home@yahoogroups.com  
> Date: Wednesday, April 6, 2011, 3:24 PM  
> Hi Hunter,  
>  
>  
>  
> Can you send or publish the formula and results you used in  
> making this  
> assumption pertaining Betz? I'm showing they are well  
> within Betz. "blade  
> lift" would not have anything to do with Betz.  
> Surface area might but this  
> could be put into the equation. Honeywell's published  
> material is very  
> similar with a smaller blade radius at 60" (1500w at  
> 31mph). I'm thinking a  
> billion dollar company wouldn't make too many mistakes on  
> their data.

>  
>  
>  
> David Raine  
>  
> DyoCore  
>  
> dyo\_gr\_lgo  
> www.dyocore.com  
>  
> p&f. 866-404-2428  
>  
> c. 760-580-4271  
>  
> dave@dyocore.com  
>  
>  
>  
> From: small-wind-home@yahoogroups.com  
> [mailto:small-wind-home@yahoogroups.com]  
> On Behalf Of hgengineer  
> Sent: Saturday, April 02, 2011 7:30 PM  
> To: small-wind-home@yahoogroups.com  
> Subject: [s-w-h] TLG Wind Turbines, Possible Scam  
>  
>  
>  
>  
> Just wanted to let everyone know that I saw a TLG wind  
> turbine at our local  
> home show. Reminds me of DyoCore, same alternator, same  
> aluminum blades, but  
> it has a tail. The seller promises the system costs 1  
> dollar after the CEC  
> rebates (6 turbines for a 10kW system).Anything "free"  
> seems too good to be  
> true. I am really getting sick of these "turbines".  
>  
> Here are the "specs"-  
>

- > Rotor diameter is 75 inches, or roughly 2 meters. Claims
- > 1800 watts at 30
- > mph. I confronted the seller, showed him Betz Law with the
- > figures plugged
- > in (I got 1600 watts with a Cp of 59.3% )and he said Betz
- > law doesn't apply
- > because the blades have some sort of special "lift". I call
- > BS.
- >
- > What do you guys think? Have you heard of TLG? Any testing
- > on these things?
- >
- > -Hunter
- >
- >
- >
- >
- >
- >
- > [Non-text portions of this message have been removed]
- >
- >
- >
- > -----
- >

---

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- > -----
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  - > [small-wind-home-subscribe@yahoogroups.com](mailto:small-wind-home-subscribe@yahoogroups.com)
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  - > (and read it on the Web), go to
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  - >
  - > . An FAQ on small wind systems is located at
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  - >

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>

**Subject:** RE: [s-w-h] Re: How is generating capacity measured?  
**From:** David Raine (dave@dyocore.com)  
**To:** wind4energy@yahoo.com;  
**Date:** Monday, July 25, 2011 5:06 PM

Hi Michael,

We have spoke in the past and I appreciate your experience within the industry. After your post I found some information on AWP turbines and it looks like you have done some discovery with them.

Would you be interested in assisting us in a similar objective. We would like to get a good resource to take a look at our turbine not just as a standalone but configured with 2 to 4 units. Though we have lots of data we really don't have the experience base to know what to do with it or even how to test according to standards that might provide a good baseline of expectations.

We have learned quite a bit this past year and as we learn more we find we are in dire need of some professional assistance especially in continuing our objectives towards making small wind work for the urban market.

Though it is my understanding that testing directly on a roof top is not an intended "standard" for testing, however, this is our application. Unfortunately it's a very daunting one in which we know our results are going to be subject to substantial limitations of the site that include the mount surface itself. However, it's our objective to provide our customers with a very realistic expectation of performance based on common residential conditions.

We have recently had some of our distributors do some pole mounted applications and have some very good data from these applications, we looking at setting up a similar "controlled" test and applying your testing knowledge/advice to our test site to make sure we have some solid baseline data that we can depend on.

Thank you for your consideration and in any event, thank you for keeping the group open to the further development of these types of solutions that apply to a broader base of alternative energy users.

David Raine

DyoCore

**Exhibit 75**



[www.dyocore.com](http://www.dyocore.com)

p&f. 866-404-2428

c. 760-580-4271

[dave@dyocore.com](mailto:dave@dyocore.com)

---

**From:** [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com) [mailto:[small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)] **On Behalf Of** Michael Klemen  
**Sent:** Monday, July 25, 2011 11:03 AM  
**To:** [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
**Subject:** Re: [s-w-h] Re: How is generating capacity measured?

Doug,

You say that I am using 4 oddball turbines. Hmmm. The turbines are what they are. You're trying to rationalize the turbines to being the same, and I think that's missing the boat a little.

The manufacturer can do as they please, and I'm OK with that.

There's nothing wrong with the Bergey's pultruded blades. That is how they chose to design them. That is a factor in how the overall machine performs. I don't consider it a negative. As

a designer, sure you could get better performance with a different

blade, but at what cost? The manufacturer chose this over other

options. That does not make it bad. The fact is, it's still flying and other turbines I have flown are not. If all of the

parts of a turbine work well together, that's what matters most.

It almost sounds like you're saying the AWP is bad for having a

small generator and governing early. That's the thing I like

the MOST about it. I love that turbine for that reason. I can

count on energy every day off of it. I don't rely on the peak



winds to generate energy. It looks like you were trying to rationalize it down to the capacity factor level of other turbines. I don't see a need to do that. In this case, the manufacturer had options, and this is what they chose to do. As with the Bergey, it is still flying.

To suggest something is working harder and that it will have a shorter life doesn't make sense to me. It's all in the design.

The AWP was designed for this. It isn't a fatal flaw. It's not like putting a small engine in a big car...it's saying simply when the wind is blowing hard, I'm not going to be greedy. I am not trying to capture the most energy...I'm going to take a little piece of the action, and protect myself.

In your case, you add more swept area to your turbine by going 3-D. That's just your choice as a manufacturer. As a consumer, it isn't good or bad. It's just your design choice. If I don't like the result, I don't have to buy it, but I certainly won't be telling you to change it!

In all honesty, I wish there were more turbines like the AWP! It could be a huge selling point for small wind. Small wind could be the grid-friendliest renewable energy arena

available (with the exception of hydro).

Mike

---

From: Doug <[doug@selsam.com](mailto:doug@selsam.com)>  
To: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
Sent: Friday, July 22, 2011 7:29 PM  
Subject: [s-w-h] Re: How is generating capacity measured?

OK well since this IS a small wind discussion, I will let you win that one... but only on a technicality of your throwing in oddball turbines (like I should talk about "oddball" turbines...).

BUT

Note that the two "normal" turbines exhibit capacity factors of 19% for one with proper tapered and twisted blades, and 16.8% for the one with pultruded, but still adequate blades. Put regular blades on the Bergey and

you would have 19% capacity factor for both turbines.

I was talking about normal turbines. In the small turbine world there are a lot of rules broken, since individuals are more tolerant of, or unaware of, bad performance, than big companies with bean-counters and investors to answer to.

The AWP is specifically configured with a small generator relative to the larger swept area and a solid, early furling regimen that keeps it from destroying itself despite the small generator. They then claim a lower peak output, and so the capacity factor is higher, mostly by proclamation. Kind of like putting a smaller engine in your car - of course it will have to work that much harder. But will the car last longer? Is it then suddenly a better designed vehicle? Or are they just stretching the rules and playing with words and statistics? Put a larger generator on that AWP and it, too will have the same capacity factor as the others. And if we are talking about windfarms, the turbines are a lot more similar.

Throwing in an Air-X is interesting, but as you point out, it governs using electronic stall control, which, in order to avoid a runaway overspeed rotor and a burned out alternator, must govern way too early and often (like voting?), since it only takes ONE runaway event to smoke the turbine (I hate when that happens...).

If a turbine is deficient in design, of course part of that sucking sound may be a lower capacity factor, but I'm not talking about aberrant machines, or machines that stretch sensible design parameters, I'm just talking about turbines that are, well, just normal.

Place 4 "normal" turbines together, even small ones, and your capacity factors will be much more similar than when you have a couple of oddball turbines way different from the rest.

Put those 4 normal turbines in Manhattan and your capacity factor will be low. Put them in your yard or mine and they will be high. That is any of them, or all of them.

Swap out regular blades for a straight profile nontapered, nontwisted blade and of course you are going to lose a few percent output. Stall the machine by shorting it out at the first hint of wind and you will stay safe and have a very low capacity factor. Then again, it's only the alleged high peak rating from which this is extrapolated. Is the cited peak output realistic? Especially if that "peak" level is just barely possible and mostly avoided?

:)  
Doug S.

--- In [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com), Michael Klemen <wind4energy@...> wrote:

>  
> Doug,  
>  
> Capacity factor is a lousy way to try to compare sites or turbines.  
>  
> From:  
>  
>  
> [http://www.ndsu.edu/ndsu/klemen/Wind\\_Turbines\\_Home.htm](http://www.ndsu.edu/ndsu/klemen/Wind_Turbines_Home.htm)  
>  
> You can see that the capacity factor of my different  
> turbines is:  
>

> Air-X: 5.8%

> WT 2500: 19.0%

> AWP 3.6: 28.6%

> XL.1: 16.8%

>

> You said:

>

> "Contrarily, at the same site, capacity factor varies NARROWLY by model."

> Well, if you talk about CF of 23% to be narrow, I guess you're right!

>

>

> You also said:

>

> "Now put them in a site with very high winds: They will ALL exhibit

>

> a higher capacity factor."

>

> That is not a truthful blanket statement. With very high winds, governing

> will come into play. Peak power isn't maintained, so CF will drop off if

> the wind speed gets too high.

> I stand by the data. CF is a lousy way to classify a site,

> and it's a poor way to compare turbines.

>

> Mike

>

>

>

>

>

---

> From: Doug <doug@...>

> To: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)

> Sent: Thursday, July 21, 2011 11:43 AM

> Subject: [s-w-h] Re: How is generating capacity measured?

>

> Hi Mike:

> Thanks for attempting to correct my statement, but I do not think your statement is true:

> What you said was: "the capacity factor of a turbine is

> > > more a result of the turbine than the site."

>

> That was in reply to my statement that the numbering of windclasses might be replaced by a typical capacity factor figure, for each site.

>

> My statement was based on the realization that most utility-scale turbines, and really most turbines in common use, are designed for economical energy capture within the range of wind speeds where economical energy capture is possible.

>

> Given the choice of commercially-available turbines, one could pick any brand, say a G.E. or a Vestas, a Suzlon, or a Siemens, install them all side-by-side at a windfarm, and you'd find that they would all exhibit a similar capacity factor, within a few percentage points, at the same site.

>

> Now put any of them, or all of them, at a site with low winds: you'll see a lower capacity factor for all.

>  
> Now put them in a site with very high winds: They will ALL exhibit a higher capacity factor.  
>  
> The capacity factor of the same turbine can vary WIDELY depending on the site, certainly much more than a few percentage points.  
> Contrarily, at the same site, capacity factor varies NARROWLY by model.  
>  
> So, capacity factor can vary a few percentage points, depending on model and brand, at a given site.½  
And capacity factor can vary from zero to 100% for the same turbine at different sites.  
>  
> Therefore the capacity factor varies more with the site than with the model.  
>  
> Therefore the site is more determinant of capacity factor than the specific turbine.  
>  
> From your statement, that it's the turbine, not the site, that mostly determines capacity factor, we'd install the same model of turbine, say a G.E. 1.5 MW machine, in low wind sites, medium wind sites, and high wind sites, and all would exhibit a similar capacity factor.  
> That would be the result of your statement, if it were true.  
>  
> Clearly this is wrong.½ Clearly, the same turbine in a low wind site will have a low capacity factor, and that same turbine installed in a medium wind site will have a medium capacity factor, and that same turbine installed in a high wind site will have a high capacity factor.  
>  
> To summarize:  
> All mainstream brands will produce similar capacity factors at similar windclass sites.  
> Any of these same turbines will produce widely different capacity factors, at sites having widely different wind classes.  
>  
> The correlation is so high that I believe it might be more instructive to call out the windclasses by capacity factor.  
>  
> Was that any clearer?  
>  
> Doug S.  
>  
>  
> --- In [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com), Michael Klemen <wind4energy@> wrote:  
>>  
>> Doug,  
>>  
>> Would you like to put that back into context?½ You said:  
>>  
>> "Rather than numbering the wind classes 1-7, maybe we should name them by capacity factor."  
>>  
>> I was trying to say that you cannot isolate the  
>>  
>> capacity factor from the turbine itself.½ The  
>>  
>> capacity factor is a really lousy way to measure/compare  
>>  
>> turbines.½ Yes, the site is a factor, I wasn't trying

>> to say it wasn't, but it's not the only factor.½ The  
>>  
>> turbine design is a huge part of it.½ It would not  
>>  
>> serve any useful purpose to rename wind classes to  
>>  
>> use capacity factor.  
>>  
>> Was that any clearer?  
>>  
>> Mike  
>>  
>>  
>>  
>>  
>>  
>>  
>>  
>>  
>>  
>>  
>>  
>>  
\_\_\_\_\_  
>> From: Doug <doug@>  
>> To: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
>> Sent: Tuesday, July 19, 2011 1:33 PM  
>> Subject: [s-w-h] Re: How is generating capacity measured?  
>>  
>> Mike K.:  
>> Really? OK what's the capacity factor of a Whisper 100?  
>> Doug S.  
>>  
>> Michael Klemen <wind4energy@> wrote:  
>>> Doug,  
>>> I would say that the capacity factor of a turbine is  
>>> more a result of the turbine than the site.½  
>>  
>>  
>>  
>> -----  
>>  
=====

>> THANK YOU FOR PARTICIPATING IN THE HOME ENERGY LIST.  
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> >  $\frac{1}{2}$  <http://www.yahogroups.com/list/small-wind-home>  $\frac{1}{2}$   
 > > . An FAQ on small wind systems is located at  
 > >  $\frac{1}{2}$  <http://www.ndsu.nodak.edu/ndsu/klemen> .

> >

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**Subject:** Re: [s-w-h] Re: How is generating capacity measured?

**From:** Michael Klemen (wind4energy@yahoo.com)

**To:** dave@dyocore.com;

**Date:** Wednesday, July 27, 2011 11:26 PM

Hi David,

Seeing as how I am now on the Certification Commission for the SWCC, it would be a conflict of interest for me to do any testing for a company that may bring their product to us for certification.

Sincerely,  
Mike

---

**From:** David Raine <dave@dyocore.com>

**To:** 'Michael Klemen' <wind4energy@yahoo.com>

**Sent:** Monday, July 25, 2011 5:06 PM

**Subject:** RE: [s-w-h] Re: How is generating capacity measured?

Hi Michael,

We have spoke in the past and I appreciate your experience within the industry. After your post I found some information on AWP turbines and it looks like you have done some discovery with them.

Would you be interested in assisting us in a similar objective. We would like to get a good resource to take a look at our turbine not just as a standalone but configured with 2 to 4 units. Though we have lots of data we really don't have the experience base to know what to do with it or even how to test according to standards that might provide a good baseline of expectations.

We have learned quite a bit this past year and as we learn more we find we are in dire need of some professional assistance especially in continuing our objectives towards making small wind work for the urban market.

Though it is my understanding that testing directly on a roof top is not an intended "standard" for testing, however, this is our application. Unfortunately it's a very daunting one in which we know our results are going to be subject to substantial limitations of the site that include the mount surface itself. However, it's our objective to provide our customers with a very realistic expectation of performance based on common residential conditions.

We have recently had some of our distributors do some pole mounted applications and have some very good data from these applications, we looking at setting up a similar "controlled" test and applying your testing knowledge/advice to our test site to make sure we have some solid baseline data that we can depend on.

Thank you for your consideration and in any event, thank you for keeping the group open to the further development of these types of solutions that apply to a broader base of alternative energy users.

**Exhibit 76**

David Raine  
DyoCore



[www.dyocore.com](http://www.dyocore.com)  
p&f. 866-404-2428  
c. 760-580-4271  
[dave@dyocore.com](mailto:dave@dyocore.com)

---

**From:** small-wind-home@yahoogroups.com [mailto:[small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)] **On Behalf Of** Michael Klemen  
**Sent:** Monday, July 25, 2011 11:03 AM  
**To:** small-wind-home@yahoogroups.com  
**Subject:** Re: [s-w-h] Re: How is generating capacity measured?

Doug,

You say that I am using 4 oddball turbines. Hmmm. The turbines are what they are. You're trying to rationalize the turbines to being the same, and I think that's missing the boat a little.

The manufacturer can do as they please, and I'm OK with that.

There's nothing wrong with the Bergey's pultruded blades. That is how they chose to design them. That is a factor in how the overall machine performs. I don't consider it a negative. As

a designer, sure you could get better performance with a different blade, but at what cost? The manufacturer chose this over other

options. That does not make it bad. The fact is, it's still flying and other turbines I have flown are not. If all of the

parts of a turbine work well together, that's what matters most.

It almost sounds like you're saying the AWP is bad for having a small generator and governing early. That's the thing I like

the MOST about it. I love that turbine for that reason. I can

count on energy every day off of it. I don't rely on the peak winds to generate energy. It looks like you were trying to

rationalize it down to the capacity factor level of other

turbines. I don't see a need to do that. In this case, the manufacturer had options, and this is what they chose to do. As with the Bergey, it is still flying.

To suggest something is working harder and that it will have a shorter life doesn't make sense to me. It's all in the design.

The AWP was designed for this. It isn't a fatal flaw. It's not like putting a small engine in a big car...it's saying simply when the wind is blowing hard, I'm not going to be greedy. I am not trying to capture the most energy...I'm going to take a little piece of the action, and protect myself.

In your case, you add more swept area to your turbine by going 3-D. That's just your choice as a manufacturer. As a consumer, it isn't good or bad. It's just your design choice. If I don't like the result, I don't have to buy it, but I certainly won't be telling you to change it!

In all honesty, I wish there were more turbines like the AWP! It could be a huge selling point for small wind. Small wind could be the grid-friendliest renewable energy arena

available (with the exception of hydro).

Mike

---

From: Doug <[doug@selsam.com](mailto:doug@selsam.com)>  
To: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
Sent: Friday, July 22, 2011 7:29 PM  
Subject: [s-w-h] Re: How is generating capacity measured?

OK well since this IS a small wind discussion, I will let you win that one... but only on a technicality of your throwing in oddball turbines (like I should talk about "oddball" turbines...).

BUT

Note that the two "normal" turbines exhibit capacity factors of 19% for one with proper tapered and twisted blades, and 16.8% for the one with pultruded, but still adequate blades. Put regular blades on the Bergey and you would have 19% capacity factor for both turbines.

I was talking about normal turbines. In the small turbine world there are a lot of rules broken, since individuals are more tolerant of, or unaware of, bad performance, than big companies with bean-counters and

investors to answer to.

The AWP is specifically configured with a small generator relative to the larger swept area and a solid, early furling regimen that keeps it from destroying itself despite the small generator.

They then claim a lower peak output, and so the capacity factor is higher, mostly by proclamation. Kind of like putting a smaller engine in your car - of course it will have to work that much harder. But will the car last longer? Is it then suddenly a better designed vehicle? Or are they just stretching the rules and playing with words and statistics? Put a larger generator on that AWP and it, too will have the same capacity factor as the others. And if we are talking about windfarms, the turbines are a lot more similar.

Throwing in an Air-X is interesting, but as you point out, it governs using electronic stall control, which, in order to avoid a runaway overspeed rotor and a burned out alternator, must govern way too early and often (like voting?), since it only takes ONE runaway event to smoke the turbine (I hate when that happens...).

If a turbine is deficient in design, of course part of that sucking sound may be a lower capacity factor, but I'm not talking about abberant machines, or machines that stretch sensible design parameters, I'm just talking about turbines that are, well, just normal.

Place 4 "normal" turbines together, even small ones, and your capacity factors will be much more similar than when you have a couple of oddball turbines way different from the rest.

Put those 4 normal turbines in Manhattan and your capacity factor will be low. Put them in your yard or mine and they will be high. That is any of them, or all of them.

Swap out regular blades for a straight profile nontapered, nontwisted blade and of course you are going to lose a few percent output. Stall the machine by shortiung it out at the first hint of wind and you will stay safe and have a very low capacity factor. Then again, it's only the alleged high peak rating from which this is extrapolated. Is the cited peak output realistic? Especially if that "peak" level is just barely possible and mostly avoided?

:)

Doug S.

-- In [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com), Michael Klemen <wind4energy@...> wrote:

>

> Doug,

>

> Capacity factor is a lousy way to try to compare sites or turbines.

>

> From:

>

>

> [http://www.ndsu.edu/ndsu/klemen/Wind Turbines Home.htm](http://www.ndsu.edu/ndsu/klemen/Wind_Turbines_Home.htm)

>

> You can see that the capacity factor of my different  
> turbines is:

>

> Air-X: 5.8%

> WT 2500: 19.0%

> AWP 3.6: 28.6%

> XL.1: 16.8%

>  
> You said:  
>  
> "Contrarily, at the same site, capacity factor varies NARROWLY by model."  
> Well, if you talk about CF of 23% to be narrow, I guess you're right!  
>  
>  
> You also said:  
>  
> "Now put them in a site with very high winds: They will ALL exhibit  
>  
> a higher capacity factor."  
>  
> That is not a truthful blanket statement.½ With very high winds, governing  
> will come into play.½ Peak power isn't maintained, so CF will drop off if  
> the wind speed gets too high.  
> I stand by the data.½ CF is a lousy way to classify a site,  
> and it's a poor way to compare turbines.½  
>  
> Mike  
>  
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> \_\_\_\_\_  
> From: Doug <doug@...>  
> To: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
> Sent: Thursday, July 21, 2011 11:43 AM  
> Subject: [s-w-h] Re: How is generating capacity measured?  
>  
> Hi Mike:  
> Thanks for attempting to correct my statement, but I do not think your statement is true:  
> What you said was: "the capacity factor of a turbine is  
> > > more a result of the turbine than the site."  
>  
> That was in reply to my statement that the numbering of windclasses might be replaced by a typical  
capacity factor figure, for each site.  
>  
> My statement was based on the realization that most utility-scale turbines, and really most turbines in  
common use, are designed for economical energy capture within the range of wind speeds where economical  
energy capture is possible.  
>  
> Given the choice of commercially-available turbines, one could pick any brand, say a G.E. or a Vestas, a  
Suzlon, or a Siemens, install them all side-by-side at a windfarm, and you'd find that they would all exhibit a  
similar capacity factor, within a few percentage points, at the same site.  
>  
> Now put any of them, or all of them, at a site with low winds:½ you'll see a lower capacity factor for all.  
>  
> Now put them in a site with very high winds: They will ALL exhibit a higher capacity factor.  
>  
> The capacity factor of the same turbine can vary WIDELY depending on the site, certainly much more than



a few percentage points.

> Contrarily, at the same site, capacity factor varies NARROWLY by model.

>

> So, capacity factor can vary a few percentage points, depending on model and brand, at a given site.½  
And capacity factor can vary from zero to 100% for the same turbine at different sites.

>

> Therefore the capacity factor varies more with the site than with the model.

>

> Therefore the site is more determinant of capacity factor than the specific turbine.

>

> From your statement, that it's the turbine, not the site, that mostly determines capacity factor, we'd install the same model of turbine, say a G.E. 1.5 MW machine, in low wind sites, medium wind sites, and high wind sites, and all would exhibit a similar capacity factor.

> That would be the result of your statement, if it were true.

>

> Clearly this is wrong.½ Clearly, the same turbine in a low wind site will have a low capacity factor, and that same turbine installed in a medium wind site will have a medium capacity factor, and that same turbine installed in a high wind site will have a high capacity factor.

>

> To summarize:

> All mainstream brands will produce similar capacity factors at similar windclass sites.

> Any of these same turbines will produce widely different capacity factors, at sites having widely different wind classes.

>

> The correlation is so high that I believe it might be more instructive to call out the windclasses by capacity factor.

>

> Was that any clearer?

>

> Doug S.

>

>

> --- In [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com), Michael Klemen <wind4energy@> wrote:

>>

>> Doug,

>>

>> Would you like to put that back into context?½ You said:

>>

>> "Rather than numbering the wind classes 1-7, maybe we should name them by capacity factor."

>>

>> I was trying to say that you cannot isolate the

>>

>> capacity factor from the turbine itself.½ The

>>

>> capacity factor is a really lousy way to measure/compare

>>

>> turbines.½ Yes, the site is a factor, I wasn't trying

>> to say it wasn't, but it's not the only factor.½ The

>>

>> turbine design is a huge part of it.½ It would not

>>

>> serve any useful purpose to rename wind classes to  
>>  
>> use capacity factor.

>>  
>> Was that any clearer?

>>  
>> Mike

>>

>>

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>> From: Doug <doug@>

>> To: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)

>> Sent: Tuesday, July 19, 2011 1:33 PM

>> Subject: [s-w-h] Re: How is generating capacity measured?

>>

>> Mike K.:

>> Really? OK what's the capacity factor of a Whisper 100?

>> Doug S.

>>

>> Michael Klemen <wind4energy@> wrote:

>>> Doug,

>>> I would say that the capacity factor of a turbine is

>>> more a result of the turbine than the site.  $\frac{1}{2}$

>>

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-----Original Message-----

From: "David Raine" <dave@dyocore.com>

To: "David Raine" <dave@dyocore.com>

Subject: testing update

Date: Fri, 9 Jul 2010 14:50:15 -0700

Hi, Hope you all had a great holiday!

Good news is we are more confident now than before that our turbines produce significant power but unfortunately through the conversion of modern inverters the efficiency in transferring that power is very low, very similar to Solar panels at the moment. We are working hard on a solution to improving this. We are working with several companies and hope to have a 3rd party solution that will interface between the Ginlong/ any inverter and the SolAir very soon.

We coordinated with Power One and should be receiving the Aurora for testing by mid next week. We will immediately put it under testing.

We have a solid lower level power curve but it's very basic and can still be improved upon. We have tested it and it works great up to about 100v from the turbine. Anything greater is right now a guessing game. We're getting our product to two of these companies we're working with that both indicate with confidence they have a solution and both are able to get the higher curve testing done at their facilities within the next week or so.

About our power curve work;

We identified when meeting with one of the engineering companies that we were not effectively doing our Amp/power testing. We made some corrections and immediately doubled our previous power output results – this still was not the best setup and left room for improvement. We will be doing some field tests this coming week that should give us some better accuracy for actual power curve testing and wind speed vs RPM.

Getting Two units is a bit more tricky to track a curve due to the aggressive and rapid increase/decrease in power for wind at the lower levels (jumping from 0 to 60 volts is quick and doesn't leave much margin for the placement of an accurate power curve. However on the higher level 2 units work great and provide a higher efficiency since most inverters sweet point for maximum performance/conversion occurs at about 250v.

3 units presents the possibility of damage to the equipment and wiring in high wind conditions and is not recommended any longer with the GinLong. During a recent testing we experienced winds in excess of 60mph that caused substantial power and resulted in visual damage to a solar film, and all testing equipment hooked up to the system, we estimate the output exceeded 6000 watts.

This has been a very dynamic learning curve for us and the engineers we've been working with. Thank you for your continued support and patience!

David Raine

DyoCore

www.dyocore.com

p&f. 866-404-2428

c. 760-580-4271

dave@dyocore.com

From: beth@ocsmallwind.com [mailto:beth@ocsmallwind.com]  
Sent: Friday, July 09, 2010 12:07 PM  
To: David Raine  
Subject: [FWD: RE:]

David, .

I want to make sure you understand that I will be placing the system of:  
two SolAir turbines and one Ginlong 2kw inverter at Santiago Canyon College  
(SCC) ASAP.

Because DyoCore's name will be all over the system I don't want there to  
be any doubts that the system will work. Let me know if you would like me to  
hold off on

Santiago Canyon College's system of: two SolAir turbines and one Ginlong  
2kw inverter

beth

Elizabeth "Beth" Bradford

Small Wind OC  
\_www.smallwindoc.com\_ (<http://www.smallwindoc.com/>)

p. 714 526-3437

f. 888 217-1416

c. 707 685-2633

\_beth@smallwindoc.com\_ (mailto:beth@smallwindoc.com)

----- Original Message -----

Subject: RE:

From: \_beth@ocsmallwind.com\_ (mailto:beth@ocsmallwind.com)

Date: Fri, July 09, 2010 11:43 am

To: "David Raine" <\_dave@dyocore.com\_ (mailto:dave@dyocore.com) >

David, thank you for contacting Todd.

When did you talk to John Hildebrand Phone:(714)680-9152,  
e-mail: \_jhildebrand41@yahoo.com\_ (mailto:jhildebrand41@yahoo.com) ? I know you emailed him  
prior to Chicago. I know he can help.

Again, are you confident the Guinlong 2kw and two SolAir turbines will  
work as a system?

Elizabeth "Beth" Bradford

Small Wind OC

[\\_www.smallwindoc.com\\_](http://www.smallwindoc.com/) (<http://www.smallwindoc.com/>)

p. 714 526-3437

f. 888 217-1416

c. 707 685-2633

[\\_beth@smallwindoc.com\\_](mailto:beth@smallwindoc.com) (<mailto:beth@smallwindoc.com>)

—— Original Message ——

Subject:

From: "David Raine" <[\\_dave@dyocore.com\\_](mailto:dave@dyocore.com) (<mailto:dave@dyocore.com>) >

Date: Fri, July 09, 2010 10:36 am

To: "Todd McKinstry" <[\\_toddmcKinstry1@yahoo.com\\_](mailto:toddmcKinstry1@yahoo.com)  
(<mailto:toddmcKinstry1@yahoo.com>) >

Cc: <[\\_beth@ocsmallwind.com\\_](mailto:beth@ocsmallwind.com) (<mailto:beth@ocsmallwind.com>) >, <[\\_rick@dyocore.com\\_](mailto:rick@dyocore.com) (<mailto:rick@dyocore.com>) >

Hi Todd,

Can you send over some information we talked about if available and your comfortable sharing this with us:

1. The package you use to sign up clients and collect \$500
1. The package you use in permitting
1. Any contacts you might have at Sacramento
1. The names of the cities you have successfully filed permits in

Thank you!

David Raine

DyoCore

[\\_www.dyocore.com\\_](http://www.dyocore.com/) (<http://www.dyocore.com/>)

p&f. 866-404-2428

c. 760-580-4271

[\\_dave@dyocore.com\\_](mailto:dave@dyocore.com) (<mailto:dave@dyocore.com>)



Dyocore, Inc.  
3125 Tiger Run Court, #104  
Carlsbad, CA 92010

P/F 866.404.2428

[www.dyocore.com](http://www.dyocore.com)



August 8, 2011

TO: Dyocore Clients, Distributors, affected persons and entities:

RE: Complaint against Dyocore by the California Energy Commission

There have been significant issues raised by the California Energy Commission through the Emerging Renewable Program which impact your deposit, rebate status, and installations.

The primary issue is a complaint filed by the CEC against Dyocore Inc. alleging fraud in the company's representation of its power curve at the time of Turbine Certification for listing on the state's list of eligible equipment.

Dyocore has denied these claims based upon the program qualification procedures calling for Dyocore to submit data to a third party certifier (KEMA Labs) who thereafter configure the data into a usable power curve and then assign a rating. In this case Dyocore was assigned 1.6kw at 18 mph. KEMA arrived at these figures in April of 2009. In June of 2011 the state of California requested that KEMA review the previously submitted data and either confirm their original configuration being correct or wrong. KEMA responded to the state saying the listing was wrong based upon the data submitted. In essence, the data confirmed as right in 2009 according to KEMA is now in error.

Using the above action as cause, the state of California is attempting to have the product de-listed, all reservations for rebates declared void, and state fraud charges be filed against Dyocore. It appears that the state could be attempting to renege on its original agreement to pay for these turbines.

Dyocore Inc. asserts that all client rebates should be honored and if a mistake was made, it was not on purpose, that Dyocore followed the state recommended guidelines and procedures for product certification and if there was an error in wind speed it is KEMA's error, not Dyocore Inc.'s. In fact another firm uses the Dyocore turbine (wholesale purchase from Dyocore), is listed on the CEC list and is not under investigation. Further, it is a well-known fact to CEC that many other turbines do not meet their stated power output and in some cases vary as much as 10 to 20 percent.

The total amount of rebates being requested for the SolAir 800 is approximately \$38 million dollars for 1,357 California families. San Diego Small Wind has 35 R-1 filings and some into the R-2 classification. Dyocore has retained attorneys to defend their legal position and their client's rights to obtain the filed rebates. Dyocore will fight these false allegations and further will not abandon our clients or obligations to our clients.

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Carlsbad, CA 92010

P/F 866.404.2428

[www.dyocore.com](http://www.dyocore.com)



CEC; Page two:

Dyocore Inc.'s financial status has been severely hampered due to these accusations causing inability to complete installations, devote effort to company growth, and added expense of legal defense of the firm. Therein, the company will be unable to refund deposits, refunds, nor complete any installations until such time as these allegations have been resolved. We estimate this time to be between 60 and 90 days.

Dyocore wants to assure current clients and future clients that it is innocent of all accusations and will defend the company, its product, and clients to their fullest extent.

During the estimated 60 to 90 day duration of the state proceedings Dyocore will continue business as usual working in the remainder of the Continental United States, and with all overseas clients.

I want to reiterate that it is Dyocore Inc.'s intention to honor each refund, deposit, or overpayments to our current clients on a dollar-for-dollar basis and to honor prevailing charges for product. As a note of record; Dyocore has refunded 25 clients their full deposits over the past year and a half due to permitting delays, unable to permit, and in some cases unexpected financial hardship, but in all cases full refund. These actions indicate by reflection a company with honorable intentions.

Best Regards:

David Raine

CEO Dyocore Inc.



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## DyoCore and Why the Rating of Small Turbines Remains a Black Art

September 23, 2011

By Paul Gipe

Despite my best efforts, I've been dragged into the DyoCore flap here in California. I successfully ignored Mick Sagrillo's plea to write something. I successfully ignored DyoCore's request to get involved on their behalf. Now the staff of the California Energy Commission (CEC) has weighed in asking me to clarify my statements.

Ok I give up. I can't stay on the sidelines any longer. (Isn't there someone else out there qualified to debunk all these "inventions" that plague us?)

My policy is to only comment on the most egregious examples of flim-flammy or when--for whatever reason--I've become personally involved. This can be as simple as being barraged with email requests of "Wow, what do you think of this super duper little turbine?" or seeing my colleague's efforts at real renewable energy development getting sideswiped by the "Why do we need big (that is, real) windmills when this little one will do everything we ever need?" crowd.



Exhibit 79



Possibly as many as two dozen DyoCore 1.2 meter diameter wind turbines atop two adjoined buildings in Morro Bay, California.

## Background

Dyocore markets a micro wind turbine, the **SolAir**, 1.2 meters in diameter. This puts the DyoCore into the same category as the Ampair 300 or the Air Breeze. All intercept about 1.1 m<sup>2</sup> of the wind stream.

The San Diego, California company has sold a slew of their turbines in the state where there is a subsidy under the CEC's Emerging Renewables Program. The subsidy is based on the turbine's power "rating" in watts or kilowatts.

The Ampair 300 is rated at 300 watts, the Air Breeze at 200 watts. (My tests indicate the Air Breeze is a reliable 150 W turbine.) However, DyoCore "rates" their turbine at--are you ready for this--1,600 watts, or 1.6 kW.

Thus, the DyoCore turbine qualifies for a hefty subsidy in California that essentially pays for the turbine.

Apparently getting the state of California to give you a free windmill is appealing to a lot of people and DyoCore "sold" a slew of machines potentially exhausting the funds in the subsidy program.

The CEC staff--playing Hamlet--felt something was rotten in DyoCore's marketing and called a halt to the program and is taking action against DyoCore.

There are a few more twists and turns in the tale, but that's the gist of it.



DyoCore and Representative Mini Wind Turbines.gpw										
Manufacturer	Model	Rotor Dia.		Area m²	Std. Power Rating*	Mfg. Rated Power	Rated Wind Speed	Perf. at Rated Power %	Loading at Rated Power	
		m	ft		kW	kW	mps		W/m²	W/m²
Marlec	Roland 503	0.51	1.7	0.2	0.04	0.03	10.0	22	0.20	122
LVM	Aero4gen F	0.66	2.8	0.6	0.12	0.07	10.3	23	0.18	121
Marlec	Roland 910-3F	0.91	3.0	0.7	0.13	0.09	10.0	22	0.23	136
Ampair	100	0.93	3.0	0.7	0.14	0.10	20.0	45	0.03	148
Southwest Windpower	Air Breeze	1.17	3.8	1.1	0.21	0.20	12.5	28	0.16	186
Ampair	300	1.20	3.9	1.1	0.23	0.30	12.5	28	0.22	205
Supersound	350	1.20	3.9	1.1	0.23	0.35	12.5	28	0.26	309
DyoCore	SolAir 1800	1.20	3.9	1.1	0.23	1.8	8.8	18	4.81	1,416
LVM	Aero6gen F	1.22	4.0	1.2	0.23	0.12	10.3	23	0.15	103
Kestrel	e150	1.5	4.9	1.8	0.35	0.6	13.5	30	0.23	340
Ampair	600	1.7	5.6	2.3	0.45	0.90	10.0	22	0.65	397
Windsave	WS 1000	1.8	5.7	2.4	0.48	1.00	12.0	27	0.39	416
Zephyr Corporation	Ardolphin	1.8	5.9	2.5	0.51	1.00	12.5	28	0.33	360
Windtronics Honeywell	2011	1.8	5.9	2.5	0.51	1.5	13.8	31	0.38	589
Marlec	Roland 1803-2	1.8	6.0	2.6	0.52	0.34	10.0	22	0.21	130
Windtronics Honeywell	WT6500	1.8	6.0	2.6	0.53	1.00	11.5	26	0.41	361
J. Bomay	Indin 600	2.0	6.6	3.1	0.63	0.60	11.0	25	0.23	191
Renewable Devices	Swift	2.1	7.0	3.5	0.71	1.50	12.5	28	0.36	425
Southwest Windpower	Whisper 100	2.1	7.0	3.6	0.72	0.90	10.0	22	0.41	252
Fortis	Espada	2.2	7.2	3.8	0.76	0.60	12.0	27	0.15	158
Bergey Windpower	XL1	2.5	8.2	4.9	0.98	1.00	11.0	25	0.25	204
Southwest Windpower	Whisper 200	2.7	8.9	5.7	1.15	1.00	10.5	24	0.25	175
Raum Energy	1.3	2.9	9.5	6.8	1.32	1.30	11	25	0.24	197
Proven Wind Turbines	2.5	3.5	11.5	9.6	1.92	2.50	10.0	22	0.42	260

\*Standard Power Rating: 200 W/m²

## Responsibility

Who is responsible for this mess? Let's just list them

- The Small turbine industry,
- The California Energy Commission,
- DyoCore, and
- Consumers.

The small turbine industry is partly to blame because if they'd listened to Mike Bergey 30-years ago--yes, that long ago--and had implemented a small turbine rating standard we wouldn't keep having this problem. They are also to blame for being in love with subsidy programs that base their payments on installed capacity, the watts or kilowatts that the turbine is presumed to produce. See **New Federal Subsidies Distort the US Small Wind Market: Or How to Increase the Power of the Skystream 3.7 with the Stroke of a Pen**. The state of California is at fault for not understanding wind energy and falling back on outdated policy--subsidies on installed capacity--that was proven ineffective and prone to abuse--again--30 years ago. See **Capital Subsidies Are Not Good Public Policy**.

DyoCore of course. Their turbine is wildly overrated, but more on that in a moment.

And consumers are to blame for not doing their homework (that includes not reading books on wind energy--some of which I've written), and for succumbing to the greed of "getting something for nothing." As the US Postal Service warns, "If it's too good to be true, it probably is."

## Power Ratings

Do I really have to go over this again? See my books. See my other articles on various small wind turbines. See **Testing the Power Curves of Small Wind Turbines**, and especially note

the sections **Power Curves** and **The Rating Game** where I first explain then rail against the power at wind speed system of rating small wind turbines.

To summarize, until very recently there was no "standard rating" of wind turbines--small or large. DyoCore's contention on this point is correct. Wind turbines can be "rated" at wind speeds from 9.5 m/s (~20 mph) to 15 m/s (~35 mph) or even higher. In wind energy, the difference between 10 m/s and 15 m/s is huge-- $5^3$  or 125 times.

In part to remedy this problem, I began using what I call a "standard power rating" of my own creation. At the time (2000) there was little prospect of the industry reaching any kind of consensus. My intent was to provide consumers with an easy way to compare small wind turbines for those who were metrically challenged since we report swept area in  $m^2$ .

A decade later, the industry is finally getting its act together but some newcomers are reluctant to play by the new rules and we continue to have the same problems we had three decades ago.

### **Gipe's Standard Power Rating**

What is my "standard power rating"? It's not very sophisticated, it's simply the product of the swept area times 200 W/ $m^2$  of rotor loading. Why 200 and not some other value? Before the dominance of rare-earth magnets in small wind turbines, most small wind turbines that were rated at a reasonable wind speed had rotor loadings that hovered around that value.

For example, at my "standard rating" the Ampair 300 is "rated" at 230 W, the Air Breeze at 210 W.

Today with rare-earth magnets, and their greater power density, that standard rating could move up some. However, I have no plans to change it. Why? Remember, I based this value on the manufacturer's "rating" of their own products. My tests at the Wulf Test Field found that all the turbines I tested, save one, substantially failed to meet their proffered power curves. The Air Breeze, for example, at the manufacturer's specified rated speed should be rated at 150 W, which is less than the 210 W in my "standard rating system".

Where does DyoCore fit in the "Gipe standard rating system"? Since it's the same size as the Ampair 300, the DyoCore would be rated at 230 W. The manufacturer's "rating" of 1.6 kW is nearly seven times greater than in my system.

### **DyoCore's Rating**

**DyoCore's web site** says that their turbine will generate 1.6 kW in a wind of 8 m/s, that is, the turbine is "rated" at 1.6 kW at 8 m/s (visited 20 September, 2011).

Can it do that? Not on this planet. The 1.6 kW rating at 8 m/s is more than four times the energy in the wind at that speed. Forget the Betz Limit, there is simply not the energy in the wind to do what DyoCore says its turbine will do.

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DyoCore is now saying privately that the turbine will generate 1.6 kW at 17 m/s (38 mph). Can it do that? Possibly, it is at least back in the realm of the real world.

Nevertheless, DyoCore's web site was still reporting the 8 m/s wind speed and that's what consumers must go on.

In the end, the DyoCore rating flap is a distraction. Ratings are only useful for a crude comparison among turbines. The flap is only important because the CEC pays out subsidies on "ratings" and the DyoCore turbine is outrageously over-rated.

In the over-rating sweepstakes, DyoCore ranks right up there with inventors of Diffuser Augmented Wind Turbines (DAWT) or wind turbines that use shrouds. DyoCore's rotor loading at rated power of 1,400 W/m<sup>2</sup> is just shy of the world record for wind turbine hype now claimed by Geneva's Elena Energie (see **Elena Diffuser Augmented Wind Turbine (DAWT): Have Parisians Drunk the Coolaid?**) of 2,100 W/m<sup>2</sup>. DyoCore just edges out Wind Cube's 1,300 W/m<sup>2</sup> (see **Wind Cube Squarely Over the Top**) to take the number two slot.

DyoCore Annual Energy Estimates								
4 m/s			4.9 m/s			5.4 m/s		
AEO	Spec.	Apprx	AEO	Spec.	Apprx	AEO	Spec.	Apprx
000	Yield	%	000	Yield	%	000	Yield	%
kWh	kWh/m <sup>2</sup>	eff	kWh	kWh/m <sup>2</sup>	eff	kWh	kWh/m <sup>2</sup>	eff
1.6	1326	2.03	2.17	1919	1.80	2.461	2176	1.36

## Energy Estimates Out of This World

What really matters of course is how much electricity these little devils produce. All the rest is puffery and marketing.

The good news is that the DyoCore's estimates of Annual Energy Production, or the Annual Energy Output of earlier days, are not as outlandish as their power ratings.

Alas, DyoCore's estimates can't be met on this planet, possibly on another planet with a thicker atmosphere, but then we don't live there and certainly the CEC gives subsidies only for wind turbines installed in California.

At an annual average wind speed of 4 m/s, the turbines are advertized to generate 2 times the energy in the wind.

At an annual average wind speed of 4.9 m/s, the turbines are advertized to generate 1.6 times the energy in the wind.

At an annual average wind speed of 5.4 m/s, the turbines are advertized to generate 1.4 times the energy in the wind.

## Solution to the Rating Black Art

The solution should be fairly obvious, don't base payments for small wind turbines on installed capacity.

In a subsequent post, I'll try to explain why the CEC and California should simply exclude small wind from the Emerging Renewables Program. Instead, small wind should be paid its cost of generation, that is, a rate per kWh of actual generation. The

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small wind industry won't like it. They'll fight it, but it's the only sure way for the small wind industry to mature. If the British can do it, so can we.

-End-

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**Exhibit 80**

1





## **C. P. "Case" van Dam**

### **Warren and Leta Giedt Professor and Department Chair**

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---

### **Education**

- **B.S.** (1975) Aerospace Engineering,  
Delft University of Technology, the  
Netherlands
- **M.S.** (1978) Aerospace Engineering,  
University of Kansas, USA
- **M.S.** (1979) Aerospace Engineering,  
Delft University of Technology
- **D. Engr.** (1983) Aerospace Engineering,  
University of Kansas

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### **Professional Experience**

#### **July 2010 - Present**

Warren and Leta Giedt Professor, Chair of the Department of Mechanical and Aerospace Engineering

#### **March 2002 - Present**

Director, California Wind Energy Collaborative ([California Wind Energy Collaborative](#))

#### **July 1985 - Present**

**Exhibit 82**

Assistant Professor (1985 - 1989), Associate Professor (1989 - 1995) and Professor (1995 - Present) in the Department of Mechanical and Aeronautical Engineering of the University of California, Davis. Teaching undergraduate and graduate courses in a wide variety of subject areas including fluid-aerodynamics, aircraft design, and wind energy. Consultant for NASA, several aircraft companies, sailing yacht designers, and wind energy companies.

### **April - July 1992, June - December 1993, January - March 1996**

Visiting Researcher at NASA Langley Research Center conducting research on high-lift aerodynamics in support of Subsonic Aircraft High-Lift Flight Project.

### **January 1984 - August 1985**

Research Associate, Vigyan Research Associates, Inc., Hampton, Virginia. Worked on the design and optimization of advanced technology lifting systems with special emphasis on cruise drag and high-angle-of-attack (stall/spin) lift characteristics. Also studied the shaping of airplane fuselages for minimum drag.

### **January - December 1983**

NRC Postdoctorate at NASA Langley Research Center. Investigated the possibilities for and the potential benefits of extensive amounts of natural laminar flow on devices such as wingtip-mounted winglets.

## **Technical Interests**

Research interests include:

- Aerodynamics including design and optimization
- Aircraft design
- Experimental and computational fluid dynamics
- Biofluidynamics
- Wind energy
- Aero-hydrodynamics of sailing

Current research includes:

- Prediction, measurement and reduction of aerodynamic drag
  - Multi-disciplinary design of aircraft high-lift systems
  - In-flight infrared imaging of boundary-layer transition and separation
  - Aerodynamics of wind turbines and aircraft at dynamic conditions
  - Micro-electro-mechanical systems for aerodynamic load control
- Also see links to [Aero Research Group](#) and [California Wind Energy Collaborative](#).

## **Professional Activities and Honors**

- Elected AIAA Associate Fellow, September 2007.
- U.S. Department of Energy award for "Outstanding Research and Development Partnership to Advance Wind Energy Technology" in partnership with Knight & Carver, and Sandia National Laboratories, May 2006.
- Associated Editor of Wind Energy for the international journal Solar Energy, Aug 2003 - July 2004.
- Member of Peer Review Panel to evaluate NASA research on Basic Aerodynamics, Langley Research Center, Hampton, VA, January 2004.

- Co-Director of Von Karman Institute for Fluid Dynamics Lecture Series on CFD-Based Aircraft Drag Prediction And Reduction, Rhode Saint Genese, Belgium, February 3-7, 2003.
  - AIAA Fluids 2000 Art of Flow Control Artistic Award for Active Load Control and Lift Enhancement using MEM Translational Tabs, June 2000.
  - Member of Peer Review Panel to evaluate NASA research on High-Lift Aerodynamics, Langley Research Center, Hampton, VA, November 1999.
  - NASA Certificate of Recognition for work on In-Flight Infrared Surface Flow Visualization, October 1998.
  - Member of Science Panel to review test of NREL research wind turbine in the NASA Ames 80' x 120' wind tunnel, Boulder, CO, October 1998.
  - NASA-ASEE Summer Faculty Fellowship Awards, 1993 and 1994.
  - Co-edited book titled Fluid Dynamics in Biology, Contemporary Mathematics, Vol. 141, 1993.
  - Co-organized/co-chaired the AMS/IMS/SIAM Joint Summer Research Conference on Biofluidynamics, University of Washington, Seattle, WA, July 6-12, 1991.
  - NASA Certificate of Recognition for the development of Crescent Wing Planforms, December 1989.
  - AIAA Lawrence Sperry Award for major innovative contributions in Applied Aerodynamics, 1989.
  - NASA-Certificate of Recognition for the development of an Aircraft Stall-Spin Entry Deterrent System, March 1988.
  - Outstanding Advisor Award of the University of California, Davis, School of Engineering, 1985 - 1986.
  - Group Achievement Award, Aerial Applications Research Team, NASA Langley Research Center, October 1983.
  - National Research Council Postdoctoral Research Associateship Award, 1983.
  - Member of Sigma Gamma Tau (National Honor Society in Aerospace Engineering).
- 

## Teaching

### Undergraduate courses

- Aeronautical Engineering Fundamentals
- Applied Aircraft Aerodynamics
- Aircraft Performance
- Aircraft Preliminary Design
- Fluid Dynamics
- Mechanical Engineering Design Project
- Thermal Fluids Laboratory

### Graduate courses

- Advanced Aerodynamics - Viscous Flow
- Advanced Aerodynamic Design and Optimization
- Aerodynamics of Flight Vehicles
- Advanced Wind-Tunnel Testing
- Wind Power Engineering

### Short Courses

- Applied Aerodynamic Drag Reduction
- Aerodynamic Drag Reduction - Fundamentals and Applications
- High-Lift Systems & Aerodynamics for General Aviation and Subsonic Transport Aircraft
- Aerodynamic Design Improvements: High-Lift and Cruise
- Wind Energy for Technicians
- Small Wind Energy Systems

Also see link to [Aerospace Short Courses](#) and [CWECC Courses](#).

---

## Patents

AIRCRAFT STALL-SPIN ENTRY DETERRENT SYSTEM, U.S. Patent No. 4,776,542, C. P. van Dam, Issued October 11, 1988.

ACTIVE SYSTEM FOR CONTROL OF AERODYNAMIC LOADING USING MICROFABRICATED TRANSLATIONAL TABS, U.S. Patent No. 7,028,954, C. P. van Dam, Issued April 18, 2006.

METHOD AND APPARATUS FOR AUTOMATICALLY GENERATING AIRFOIL PERFORMANCE TABLES, U.S. Patent No. 7,124,038, C. P. van Dam, Issued October 17, 2006.

---

## Selected Publications

FLIGHT EVALUATION OF THE EFFECT OF WINGLETS ON PERFORMANCE AND HANDLING QUALITIES OF SINGLE-ENGINE GENERAL AVIATION AIRPLANE, B. J. Holmes, C. P. van Dam, P. W. Brown, and P. L. Deal, NASA TM 81892, Dec. 1980.

LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF THE ATLIT AIRPLANE, J. Roskam, C. P. van Dam, and M. Griswold, Journal of Aircraft, Vol. 18, No. 6, Jun. 1981, 495-496.

EFFECT OF WINGLETS ON PERFORMANCE AND HANDLING QUALITIES OF GENERAL AVIATION AIRCRAFT, C. P. van Dam, B. J. Holmes and C. Pitts, Journal of Aircraft, Vol. 18, No. 7, Jul. 1981, pp. 587-591.

AN EXPERIMENTAL AND THEORETICAL INVESTIGATION OF DEPOSITION PATTERNS FROM AN AGRICULTURAL AIRPLANE, D. J. Morris, C. C. Croom, C. P. van Dam, and B. J. Holmes, NASA TP 2348, Sep. 1984.

NATURAL LAMINAR FLOW AND AIRPLANE STABILITY AND CONTROL, C. P. van Dam, Laminar Flow Aircraft Certification, NASA CP 2413, Proceedings of a workshop held in Wichita, KS, Apr. 14-15, 1985.

SWEPT WING-TIP SHAPES FOR LOW-SPEED AIRPLANES, C. P. van Dam, SAE Paper 851770, Oct. 1985 (SAE Transactions, Vol. 94, 1986, pp. 355).

EFFICIENCY CHARACTERISTICS OF CRESCENT-MOON SHAPED WINGS AND CAUDAL FINs, C. P. van Dam, Nature, Vol. 325, No. 6103, Feb. 1987, pp. 435-437.

SHAPING OF AIRPLANE FUSELAGES FOR MINIMUM DRAG, S. S. Dodbele, C. P. van Dam, P.M.H.W. Vijgen, and B. J. Holmes, Journal of Aircraft, Vol. 24, No. 5, May 1987, pp. 298-304.

BOUNDARY-LAYER TRANSITION EFFECTS ON AIRPLANE STABILITY AND CONTROL, C. P. van Dam, and B. J. Holmes, Journal of Aircraft, Vol. 25, No. 8, Aug. 1988, pp. 702-709.

EFFECTS OF COMPRESSIBILITY ON DESIGN OF SUBSONIC NATURAL LAMINAR FLOW FUSELAGES, P.M.H.W. Vijgen, S. S. Dodbele, B. J. Holmes, and C. P. van Dam, Journal of Aircraft, Vol. 25, No. 9, Sep. 1988, pp. 776-784.

IN WIND AND WATER, C. P. van Dam, The Sciences, Jan-Feb. 1988, pp. 36-39.



KEEL DESIGN FOR LOW VISCOUS DRAG, C. J. Obara, and C. P. van Dam, Journal of Ship Research, Vol. 33, No. 2, Jun. 1989, pp. 145-155.

SHEARED WING-TIP AERODYNAMICS: WIND-TUNNEL AND COMPUTATIONAL INVESTIGATION, P.M.H.W. Vijgen, C. P. van Dam, and B. J. Holmes, Journal of Aircraft, Vol. 26, No. 3, Mar. 1989, pp. 207-213.

WIND-TUNNEL INVESTIGATIONS OF WINGS WITH SERRATED SHARP TRAILING EDGES, P.M.H.W. Vijgen, C. P. van Dam, B. J. Holmes, and F. G. Howard, Low Reynolds Number Aerodynamics, Lecture Notes in Engineering, No. 54, T. J. Mueller (Ed.), Springer-Verlag, 1989, pp. 295-313.

KEELS AND RUDDERS WITH HIGHLY SWEEPED TIPS, C. P. van Dam, P.M.H.W. Vijgen, and C. J. Obara, SailTech-89, Vol. 35, Western Periodicals Company, Proceedings of the 18th Annual Conference on Sailing Technology held at Stanford University, CA, Oct. 14-15, 1989.

COMPARISON OF ITERATIVE AND DIRECT SOLUTION METHODS FOR VISCOUS FLOW PROBLEMS, C. P. van Dam, and M. Hafez, AIAA Journal, Vol. 27, No. 10, Oct. 1989, pp. 1459-1461.

UNSTEADY VISCOUS FLOW CALCULATIONS INCLUDING SURFACE HEATING AND COOLING EFFECTS, C. P. van Dam, M. Hafez, D. Brucker, and S. Elli, Notes on Numerical Fluid Mechanics, P. Wesseling (Ed.), Vol. 29, Vieweg, 1990, pp. 79-88.

CALCULATIONS OF VISCOUS FLOW WITH SEPARATION USING NEWTON'S METHOD AND DIRECT SOLVER, C. P. van Dam, M. Hafez, J. Ahmad, AIAA Journal, Vol. 28, No. 5, May 1990, pp. 938-940.

CALCULATION AND MEASUREMENT OF INDUCED DRAG AT LOW SPEEDS, C. P. van Dam, K. Nikfetrat, P.M.H.W. Vijgen, and C. M. Fremaux, SAE Paper 901935, Oct. 1990.

COMMENT ON "OPTICAL BOUNDARY-LAYER TRANSITION DETECTION IN A TRANSONIC WINDTUNNEL," P.M.H.W. Vijgen, C. P. van Dam, and C. J. Obara, AIAA Journal, Vol. 28, No. 12, Dec. 1990, pp. 2142-2143.

AERODYNAMIC CHARACTERISTICS OF CRESCENT AND ELLIPTIC WINGS AT HIGH ANGLES OF ATTACK, C. P. van Dam, P.M.H.W. Vijgen, and B. J. Holmes, Journal of Aircraft, Vol. 28, No. 4, Apr. 1991, pp. 253-260.

THE INFLUENCE OF A LAMINAR SEPARATION BUBBLE ON BOUNDARY-LAYER STABILITY, S. Elli, and C. P. van Dam, AIAA Paper 91-3294, Sep. 1991.

EXPERIMENTAL INVESTIGATION ON THE EFFECT OF CRESCENT PLANFORM ON LIFT AND DRAG, C. P. van Dam, P.M.H.W. Vijgen, and B. J. Holmes, Journal of Aircraft, Vol. 28, No. 11, Nov. 1991, pp. 713-720.

THE INFLUENCE OF BULGES ON BOUNDARY-LAYER INSTABILITY, S. Elli, C. P. van Dam, and K. Nikfetrat, 5th Symposium on Numerical and Physical Aspects of Aerodynamic Flows, Long Beach, CA, Jan. 13-16, 1992.

SUBSONIC AND TRANSONIC LOW-REYNOLDS-NUMBER AIRFOILS WITH REDUCED PITCHING MOMENTS, J. Reuther, C. P. van Dam, and R. Hicks, Journal of Aircraft, Vol. 29, No. 3, May-Jun. 1992, pp. 297-298.

ACCURATE PREDICTION OF DRAG USING EULER METHODS, C. P. van Dam, and K. Nikfetrat, Journal of Aircraft, Vol. 29, No. 3, May-Jun. 1992, pp. 516-519.

SIMULATION OF NONLINEAR TOLLMIE-SCHLICHTING WAVE GROWTH THROUGH A LAMINAR SEPARATION BUBBLE, C. P. van Dam, and S. Elli, Instability, Transition, and Turbulence, M. Y. Hussaini, A. Kumar and C. L. Streett (Eds.), Springer-Verlag, 1992, pp. 311-321.

TURBULENCE EFFECTS ON THE DESIGN AND PERFORMANCE OF LOW-DRAG KEELS, P.M.H.W. Vijgen, C. P. van Dam, and C. J. Obara, Journal of Ship Research, Vol. 36, No. 3, Sep. 1992, pp. 268-279.

LIFT AND DRAG CALCULATIONS FOR WINGS AND TAILS: TECHNIQUES AND APPLICATIONS, C. P. van Dam, K. Nikfetrat, and P.M.H.W. Vijgen, Contemporary Mathematics, Vol. 141, 1993, pp. 463-477.

COMPARISON OF PREDICTIONS OF AIRFOIL CHARACTERISTICS FOR THE NREL S805 AND S809 AIRFOILS, D. B. Bernadett, and C. P. van Dam, Proceedings of the Windpower '93 Conference, San Francisco, CA, Jul. 1993, pp. 290-298.

ACCURATE DRAG PREDICTION - A PREREQUISITE FOR DRAG REDUCTION RESEARCH, K.J. Wong, T.K. Ayers, and C.P. van Dam, SAE Paper 932571, Sep. 1993 (SAE Transactions, Section 1, Vol. 102, 1993, pp. 1882-1891).

IN-FLIGHT PRESSURE DISTRIBUTIONS AND SKIN-FRICTION MEASUREMENTS ON A SUBSONIC TRANSPORT HIGH-LIFT WING SECTION, L.P. Yip, J.D. Hardin, P.M.H.W. Vijgen, and C.P. van Dam, High-Lift System Aerodynamics, AGARD CP-515, Sep. 1993, pp. 21-1 thru 21-19.

APPLIED AERODYNAMICS, C.P. van Dam, Aerospace America, Dec. 1993, pp. 12-13.

AIRFOIL SHAPING FOR REDUCED RADAR CROSS SECTION, H. Vinh, C.P. van Dam, and H.A. Dwyer, Journal of Aircraft, Vol. 31, No. 4, Jul-Aug. 1994, pp. 787-793.

NUMERICAL STUDY ON THE EFFECT OF TIP-CAP SHAPE ON WING AERODYNAMIC CHARACTERISTICS, K.J. Wong and C.P. van Dam, AIAA Paper 95-0042, Jan. 1995.

THE NASA B737-100 HIGH-LIFT PROGRAM - MEASUREMENTS AND COMPUTATIONS, L.P. Yip, C.P. van Dam, J.H. Whitehead, J.D. Hardin, S.J. Miley, R.G. Potter, A. Bertelrud, D.D. Edge, and P.E. Willard, Aeronautical Journal, Vol. 99, No. 989, Nov. 1995, pp. 372-386.

IN-FLIGHT PRESSURE MEASUREMENTS ON A SUBSONIC TRANSPORT HIGH-LIFT WING SECTION, L.P. Yip, P.M.H.W. Vijgen, J.D. Hardin, and C.P. van Dam, Journal of Aircraft, Vol. 32, No. 3, May- Jun. 1995, pp. 529-538.

DRAG PREDICTION AT SUBSONIC AND TRANSONIC SPEEDS USING EULER METHODS, C.P. van Dam, K. Nikfetrat, K. Wong, and P.M.H.W. Vijgen, Journal of Aircraft, Vol. 32, No. 4, Jul-Aug. 1995, pp. 839-845.

SLAT TRANSITION CHARACTERISTICS ON THE NASA B737-100 AIRCRAFT USING INFRARED IMAGING AND HOT-FILM ANEMOMETRY, S.J. Miley, C.P. van Dam, L.P. Yip, P.E. Willard, J.P. Crowder, and R.L. Watzlavick, Flow Visualization VII, J. Crowder (Ed.), Begell House, Sep. 1995, pp. 950-956.

FINITE DIFFERENCE MAXWELL SOLVER TO STUDY GEOMETRIC SHAPE EFFECTS ON RADAR SIGNATURE, H. Vinh, C.P. van Dam, and H.A. Dwyer, Journal of Aircraft, Vol. 34, No. 1, Jan-Feb. 1997, pp. 56-63.

IN-FLIGHT BOUNDARY-LAYER MEASUREMENTS ON A HIGH-LIFT SYSTEM: SLAT, C.P. van Dam, S.M. Los, S.J. Miley, V.E. Roback, L.P. Yip, A. Bertelrud, and P.M.H.W. Vijgen, Journal of Aircraft, Vol. 34, No. 6, Nov-Dec. 1997, pp. 748-756.

IN-FLIGHT BOUNDARY-LAYER MEASUREMENTS ON A HIGH-LIFT SYSTEM: MAIN ELEMENT AND FLAP, C.P. van Dam, S.M. Los, S.J. Miley, V.E. Roback, L.P. Yip, A. Bertelrud, and P.M.H.W. Vijgen, Journal of Aircraft, Vol. 34, No. 6, Nov-Dec. 1997, pp. 757-763.

STATISTICAL ANALYSIS OF IN-FLIGHT HOT-FILM SIGNALS OF TRANSITIONAL FLOWS, S.M. Los, and C.P. van Dam, AIAA Paper 98-2440, Jun. 1998.

REMOTE IN-FLIGHT INFRARED IMAGING FOR ANALYZING SURFACE FLOWS, D.W. Banks, C.P. van Dam, and H.J. Shiu, NASA Tech Briefs, Sep. 1998, p. 76.



GURNEY FLAP EXPERIMENTS ON AIRFOIL AND WINGS, C.P. van Dam, D.T. Yen, and P.M.H.W. Vijgen, *Journal of Aircraft*, Vol. 36, No.2, Mar-Apr. 1999, pp. 484-486.

AIRFOIL DRAG PREDICTION AND DECOMPOSITION, D.D. Chao, and C.P. van Dam, *Journal of Aircraft*, Vol. 36, No. 4, Jul-Aug. 1999, pp. 675-681.

AERO-MECHANICAL DESIGN METHODOLOGY FOR SUBSONIC CIVIL TRANSPORT HIGH-LIFT SYSTEMS, C.P. van Dam, S.G. Shaw, J.C. Vander Kam, R.R. Brodeur, P.K.C. Rudolph, and D. Kinney, NATO Research & Technology Agency Applied Vehicle Technology Panel Symposium on Aerodynamic Design and Optimization of Flight Vehicles in a Concurrent Multi-Disciplinary Environment, Ottawa, Canada, Oct. 18-21, 1999.

AERO-MECHANICAL DESIGN OF HIGH-LIFT SYSTEMS, C.P. van Dam, S.G. Shaw, J.C. Vander Kam, P.K.C. Rudolph, and D. Kinney, *Aircraft Engineering and Aerospace Technology*, Vol. 71, No. 5, 1999, pp. 436-443.

RECENT EXPERIENCE WITH DIFFERENT METHODS OF DRAG PREDICTION, C.P. van Dam, *Progress in Aerospace Sciences*, Vol. 35, No. 8, Nov. 1999, pp. 751-798.

ACTIVE LOAD CONTROL AND LIFT ENHANCEMENT USING MEM TRANSLATIONAL TABS, D.T. Yen, C.P. van Dam, F. Bräuchle, R.L. Smith, and S.D. Collins, *AIAA Fluids 2000*, AIAA Paper 2000-2422, Denver, CO, Jun. 2000.

VISUALIZATION OF IN-FLIGHT FLOW PHENOMENA USING INFRARED THERMOGRAPHY, D.W. Banks, C.P. van Dam, H.J. Shiu, and G.M. Miller, *NASA TM-2000-209027*, Jul. 2000.

COMPUTATIONAL STUDY OF ROTARY TESTS ON FOREBODY MODELS, C.P. van Dam, T. Dal Bello, E. Duque, C.M. Fremaux, *AIAA Atmospheric Flight Mechanics Conference*, AIAA paper 2000-4105, Denver, CO, Aug. 14-17, 2000.

WIND TURBINES, C.P. van Dam, *McGraw-Hill Yearbook of Science & Technology 2002*, McGraw-Hill, New York, 2001, pp. 413-416.

ACTIVE LOAD CONTROL FOR AIRFOILS USING MICROTABS, D.T. Yen Nakafuji, C.P. van Dam, R.L. Smith, and S.D. Collins, *Journal of Solar Energy Engineering*, Vol. 123, No. 4, Nov. 2001, pp. 282-289.

TRANSITION PREDICTION FOR A TWO-DIMENSIONAL NAVIER-STOKES SOLVER APPLIED TO WIND-TURBINE AIRFOILS, R.R. Brodeur, and C.P. van Dam, *Wind Energy*, Vol. 4, No. 2, 2001, pp. 61-75.

DESIGN-ORIENTED HIGH-LIFT METHODOLOGY FOR GENERAL AVIATION AND CIVIL TRANSPORT AIRCRAFT, C.P. van Dam, J.C. Vander Kam, and J.K. Paris, *Journal of Aircraft*, Vol. 38, No. 6, Nov-Dec. 2001, pp. 1076-1084.

BUBBLE INDUCED UNSTEADINESS ON A WIND TURBINE AIRFOIL, E.A. Mayda, C.P. van Dam, *Journal of Solar Energy Engineering*, Vol. 124, NO. 4, Nov. 2002, pp. 335-344.

THE AERODYNAMIC DESIGN OF MULTI-ELEMENT HIGH- LIFT SYSTEMS FOR TRANSPORT AIRPLANES, C.P. van Dam, *Progress in Aerospace Sciences*, Vol. 38, No.2, 2002, pp. 101-144.

IN-FLIGHT VISUALIZATION OF SUPERSONIC FLOW TRANSITION USING INFRARED IMAGING, C.P. van Dam, H.J. Shiu, D.W. Banks, R.R. Tracy, and J. Chase, *Journal of Aircraft*, Vol. 39, No. 6, Nov-Dec. 2002, pp. 936-944.

BLADE-WAKE INTERACTION NOISE FOR TURBINES WITH DOWNWIND ROTORS, G.M. McNerney, C.P. van Dam, D.T. Yen-Nakafuji, *Journal of Solar Energy Engineering*, Vol. 125, No. 4, Nov. 2003, pp. 497-505.

AERODYNAMIC ANALYSIS OF BLUNT TRAILING EDGE AIRFOILS, K.J. Standish and C.P. van Dam, *Journal of Solar Energy Engineering*, Vol. 125, No. 4, Nov. 2003, pp. 479-487.

SIMULATION OF FLOW ABOUT ROTATING FOREBODIES AT HIGH ANGLES OF ATTACK, S. Saephan, C.P. van Dam, C.M. Fremaux, and T. DalBello, *Journal of Aircraft*, Vol. 41, No. 6, Nov-Dec. 2004, pp. 1298-1305.

INNOVATIVE DESIGN APPROACHES FOR LARGE WIND TURBINE BLADES, K. Jackson, M. Zuteck, C.P. van Dam, K.J. Standish, and D. Berry, *Wind Energy*, Vol. 8, No. 2, Apr-Jun. 2005, pp. 141-171.

COMPUTATIONAL ANALYSIS OF A MICRO-TAB BASED AERODYNAMIC LOAD CONTROL SYSTEM FOR ROTOR-BLADES, K.J. Standish and C.P. van Dam, *Journal of the American Helicopter Society*, Vol. 50, No. 3, Jul. 2005, pp. 249-258.

AUTOMATIC GENERATION OF AIRFOIL PERFORMANCE TABLES USING A TWO-DIMENSIONAL NAVIER-STOKES SOLVER, E.A. Mayda and C.P. van Dam, *Journal of the American Helicopter Society*, Vol. 50, No. 4, Oct. 2005, pp. 338-348.

WING DRAG PREDICTION AND DECOMPOSITION, D.D. Chao and C.P. van Dam, *Journal of Aircraft*, Vol. 43, No. 1, Jan-Feb. 2006, pp. 82-90.

UNSTEADY COMPUTATIONAL INVESTIGATIONS OF DEPLOYING LOAD CONTROL TABS, R. Chow and C.P. van Dam, *Journal of Aircraft*, Vol. 43, No. 5, Sep-Oct. 2006, pp. 1458-1469.

EXPERIMENTAL ANALYSIS OF A THICK BLUNT TRAILING EDGE WIND TURBINE AIRFOIL, J.P. Baker, E.A. Mayda, and C.P. van Dam, *Journal of Solar Energy Engineering*, Vol. 128, No. 4, Nov. 2006, pp. 422-431.

DESIGN AND NUMERICAL OPTIMIZATION OF THICK AIRFOILS, T. Winnemoller and C.P. van Dam, *Journal of Aircraft*, Vol. 44, No. 1, Jan-Feb. 2007, pp. 232-240.

TWO-DIMENSIONAL WIND TUNNEL AND COMPUTATIONAL INVESTIGATION OF A MICROTAB MODIFIED AIRFOIL, J.P. Baker, K.J. Standish, and C.P. van Dam, *Journal of Aircraft*, Vol. 44, No. 2, Mar-Apr. 2007, pp. 563-572.

COMPUTATIONAL AERODYNAMIC ANALYSIS OF AN INBOARD BLUNT TRAILING EDGE MODIFICATION TO THE NREL PHASE VI ROTOR, D.D. Chao and C.P. van Dam, *Wind Energy*, Vol. 10, No. 6, Nov-Dec. 2007, pp. 529-550.

DETERMINATION OF WING-ONLY AIRCRAFT TUMBLING CHARACTERISTICS THROUGH COMPUTATIONAL FLUID DYNAMICS, S. Saephan and C.P. van Dam, *Journal of Aircraft*, Vol. 45, No. 3, May-Jun. 2008, pp. 1044-1053.

ON THE TEMPORAL RESPONSE OF ACTIVE LOAD CONTROL DEVICES, R. Chow, C.P. van Dam, *Wind Energy*, Vol. 13, No. 2-3, 2010, pp. 135-149.

AN OVERVIEW OF ACTIVE LOAD CONTROL TECHNIQUES FOR WIND TURBINES WITH AN EMPHASIS ON MICROTABS, S.J. Johnson, J.P. Baker, C.P. van Dam, D.E. Berg, *Wind Energy*, Vol. 13, No. 2-3, 2010, pp. 239-253.

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Last modified: July 14, 2010

### Determining a Power Curve of a Wind Turbine.

The following notes are loosely based on International Standard IEC61400-12 (Wind Turbine Power Performance Testing) and provide a general overview of the measurements and analyses required to produce a power curve of a wind turbine. Figure 1 depicts a typical power curve for a small wind turbine with wind turbine power output in watt (W) or kilowatt along the vertical axis and wind speed in meter per second (m/s) along the horizontal axis.

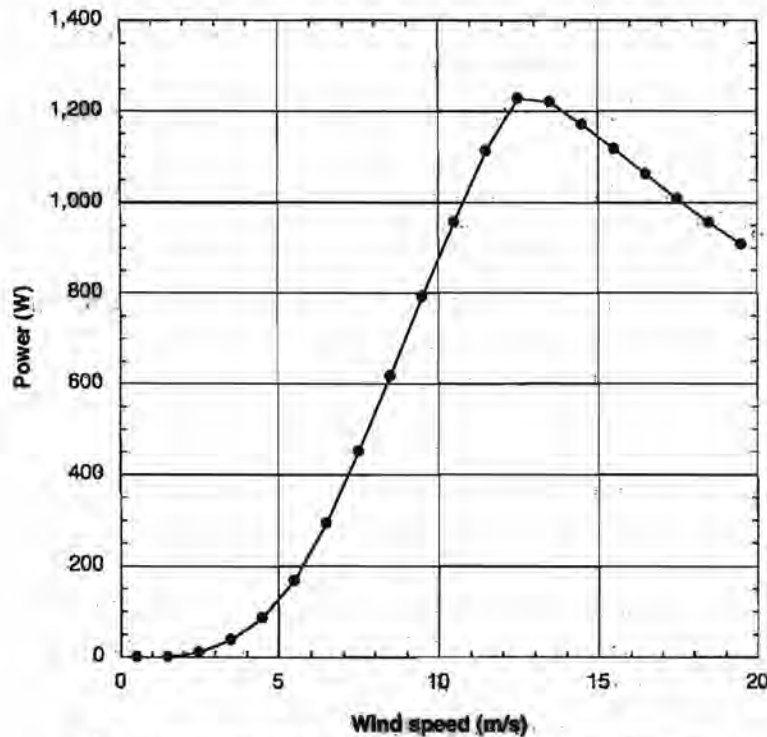


Fig. 1: Normalized power curve of a wind turbine

#### Required test equipment:

- Electric power measurement device based on electric current and voltage
- Wind speed measurement instrument, typically a cup anemometer that is installed at hub height (height of center of rotor)
- Wind direction measurement instrument, typically a wind vane that is mounted near hub height
- Air temperature measurement instrument needed to determine air density
- Air pressure measurement instrument needed to determine air density
- Data acquisition system to collect the above data as a function of time

#### Measurement procedure:

- Wind turbine should operate normally with all data collected contiguously
- Power and wind data should be collected at a data rate of at least twice per second
- Temperature and pressure data should be collected at a data rate of at least once per minute

- Measurements should cover wind speed range to 1.5 times the wind speed at 85% of rated power

#### Data analysis:

- Data sets are based on 10 minute periods
- Discard data sets acquired while the turbine is unavailable
- Discard data sets acquired when test equipment is failing
- Discard data sets acquired for wind directions outside the measurement sector
- For each data set determine average power ( $P_{10min}$  in watt or kilowatt), average wind speed ( $V_{10min}$  in meter/second), average air pressure ( $p_{10min}$  in pascal), and average air temperature ( $T_{10min}$  in kelvin)
- For each data set calculate average air density using following equation:  

$$\rho_{10min} = p_{10min} / (287 \times T_{10min})$$
 where  $\rho_{10min}$  is the average air density in kilogram/cubic-meter
- Normalize the data sets by correcting for air density that is not standard ( $\rho_{10min} = 1.225$  kilogram/cubic-meter):
  - For stall controlled turbines operating at constant rpm:  

$$Pn_{10min} = P_{10min} \times 1.225 / \rho_{10min}$$

$$Vn_{10min} = V_{10min}$$
  - For turbines with active power control:  

$$Pn_{10min} = P_{10min}$$

$$Vn_{10min} = V_{10min} \times (\rho_{10min} / 1.225)^{1/3}$$

#### Power curve determination:

- Sort the normalized data sets using 0.5 meter/second wind speed bins
- Each wind speed bin shall have at least 30 minutes of data (3 data sets)
- Average the normalized power for each wind speed bin
- Average the normalized wind speed for each wind speed bin
- Plot the averaged normalized power as a function of the normalized wind speed (see Fig. 1 in the case of 1 meter/second wind speed bins)







# COMMISSION GUIDEBOOK

## RENEWABLE ENERGY PROGRAM OVERALL PROGRAM GUIDEBOOK

Third Edition



CALIFORNIA  
ENERGY COMMISSION

Edmund G. Brown, Jr., Governor

JANUARY 2011

CEC-300-2010-008-CMF

## **VII. Enforcement Action**

### **A. Recovery of Overpayment**

The Committee, with the concurrence of the Energy Commission, may direct the Energy Commission's Office of Chief Counsel to commence formal legal action against any awardee or former awardee to recover any portion of a funding award that the Committee determines the awardee or former awardee was not otherwise entitled to receive.

### **B. Fraud and Misrepresentation**

The Committee may initiate an investigation of any awardee who the Committee has reason to believe may have misstated, falsified, or misrepresented information in applying for registration, funding, or RPS certification, invoicing for a funding award payment, or reporting any information required by these *Guidelines*. Based on the results of the investigation, the Committee may take any action it deems appropriate, including, but not limited to, revocation of the registration, cancellation of the funding award or RPS certification, recovery of any overpayment, and, with the concurrence of the Energy Commission, recommending the Attorney General initiate an investigation and prosecution pursuant to Government Code Section 12650, et seq., or other provisions of law.

**CALIFORNIA  
ENERGY  
COMMISSION**

**EMERGING  
RENEWABLES  
PROGRAM**

**Tenth Edition**

**FINAL GUIDEBOOK**

April 2010

CEC-300-2010-003-F



*Arnold Schwarzenegger, Governor*

**Exhibit 87**

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**These guidelines were formally adopted by the California Energy Commission on February 19, 2003, pursuant to Public Utilities Code section 383.5, subdivision (h), and subsequently revised pursuant to this authority and Public Resources Code section 25747, subdivision (a), on December 17, 2003, May 19, 2004, June 30, 2004, January 19, 2005, June 22, 2005, January 18, 2006, June 29, 2006, December 13, 2006, February 25, 2009 and April 7, 2010.**

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## Abstract

The Emerging Renewables Program provides rebates and production incentives to end-use consumers who purchase and install renewable energy technologies, specifically small wind systems and fuel cells, for on-site generation. Payments from the Emerging Renewables Program are intended to reduce the net cost of generating equipment using emerging renewable technologies and thereby stimulate substantial sales of such systems. Increased sales of generating equipment are expected to encourage manufacturers, sellers, and installers to expand their operations and reduce their costs per unit.

Along with expanding the sales of emerging renewable technology systems, another goal of the Emerging Renewables Program is to encourage the siting of small, reliable distributed generating systems throughout California in locations where the produced electricity is both needed and consumed.

This Guidebook describes the rules and process for applying and claiming a rebate under the Emerging Renewables Program. This Guidebook also contains copies of all the forms necessary for the rebate process.

**Keywords:** emerging, renewable, program, ERP, California Energy Commission, small wind, fuel cell, rebate, incentive, electricity production, distributed generation, guidelines, eligibility

## What's New in This Guidebook?

Below are the major changes in this edition of the *Emerging Renewables Program Guidebook* as compared to the February 2009 edition of the *ERP Guidebook*.

- The rebate level and structure for small wind have been changed. The new rebate for small wind is **\$3.00/watt for the first 10 kW, through April 7, 2011, and \$1.50/watt for increments greater than 10 kW and less than 30 kW.**
- The conversion efficiency test, continuous power test and tare loss test requirements for inverters has been removed. The requirements for UL 1741 certification remains. This requirement is for inverters that will be used exclusively with small wind turbines and fuel cells.
- Incentives for small wind turbines and fuel cells are calculated by multiplying the rated output by the incentive level. Inverter efficiency is no longer used to calculate rebate amounts.
- The reservation period is now 12 months.
- Retailers and installers no longer need to submit the R4 Equipment Seller Information Form to the Energy Commission. Retailers and installers must now register themselves via on-line website.
- Clarifies requirements and restrictions regarding leasing renewable energy systems.

# I. Introduction

This *Emerging Renewables Program Guidebook* is one of several guidebooks the California Energy Commission (Energy Commission) has adopted to implement the Renewable Energy Program pursuant to Senate Bill 1038<sup>1</sup>, Senate Bill 183<sup>2</sup>, Senate Bill 1250<sup>3</sup>, and Senate Bill 107.<sup>4</sup> It describes the requirements for receiving funding for the installation and operation of non-solar renewable energy systems under the Emerging Renewables Program (ERP) element of the Renewable Energy Program.

The Energy Commission has adopted additional guidebooks to address the requirements for the other elements of the Renewable Energy Program and guidelines governing the overall administration of the Renewable Energy Program. The *Overall Program Guidebook* describes how the Renewable Energy Program will be administered and includes information and requirements that apply to all program elements of the Renewable Energy Program.

Applicants requesting funding under the Emerging Renewables Program must satisfy the requirements contained in both the *Overall Program Guidebook* and this *Emerging Renewables Program Guidebook*. This guidebook replaces the previous guidebook governing the Emerging Renewables Program (*the Emerging Renewables Program Guidebook, Ninth Edition*). Applications for funding approved under the previous program guidebook remain governed by the previous guidebook until the projects are completed, expired, or cancelled.

Funding for the installation and operation of solar photovoltaic systems on new residential construction is available under the Energy Commission's *New Solar Homes Partnership*. Funding for the installation and operation of solar photovoltaic systems on existing residential and new and existing non-residential buildings is available under the California Public Utilities Commission's *California Solar Initiative*. Information on these two programs can be found at [[www.gosolarcalifornia.org](http://www.gosolarcalifornia.org)].

## A. Purpose

The ERP was created to help develop a self-sustaining market for renewable energy systems that supply on-site electricity needs across California. Through this program, the Energy Commission provides funding to offset the cost of purchasing and installing new renewable energy systems using emerging renewable technologies.

The goal of the ERP is to reduce the net cost of on-site renewable energy systems to end-use consumers, and thereby stimulate demand and increased sales of such systems. Increased sales are expected to encourage manufacturers, sellers, and installers to expand operations, improve distribution, and reduce system costs.

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1 Stats. 2002, Ch. 515, §§ 15 & 16, as codified in Public Utilities Code §§ 383.5 and 445.

2 Stats. 2003, Ch. 666, §§ 1 & 2, as codified in Public Resources Code §§ 25401.6, and 25740 - 25751.

3 Stats. 2006, Ch. 512, §§ 9-14, as codified in Public Resources Code §§ 25740.5 - 25747.

4 Stats. 2006, Ch. 464, §§ 7 & 9, as codified in Public Resources Code §§ 25744.5 and 25746.



Funding for the Renewable Energy Program is collected from the ratepayers of four investor-owned utilities in California to support existing, new, and emerging renewable electricity generation technologies. For more information about the Renewable Energy Program, please visit the Energy Commission's website at [\[www.energy.ca.gov/renewables\]](http://www.energy.ca.gov/renewables).

For consumer tips on purchasing a renewable energy system to supply on-site electricity needs please refer to Appendix 2 of this guidebook. Also see *Buying a Small Wind Electric System, February 2002* for further information. This and other documents are available on the Energy Commission's website at [\[www.consumerenergycenter.org\]](http://www.consumerenergycenter.org).

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## B. Overview

The ERP provides electricity consumers with a financial incentive to install renewable energy systems on their property. The financial incentive varies based on system size, technology, and type of installation and is paid once the system is installed and operational. The consumer must apply to the Energy Commission for funding using the protocols in this guidebook.

To qualify for an incentive, both the consumer and the renewable energy system must satisfy a number of requirements. The consumer must receive electricity distribution service at the site of installation from an existing in-state electrical corporation contributing funds to support the program. These electrical corporations are Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), San Diego Gas & Electric Company (SDG&E), and Golden State Water Company (doing business as Bear Valley Electric Service (BVES)).

The renewable energy system must utilize one of two emerging renewable technologies: fuel cells using renewable fuels or small wind turbines.<sup>5</sup> The system must also use new components that are certified or tested to be reliable and come with a five-year warranty. In addition, the renewable energy system must generate electricity to offset the consumer's on-site electrical load. Lastly, the system must be interconnected to the utility distribution grid, unless the system is a fuel cell system used for backup generation for emergency, safety, or telecommunication purposes.

A "backup generation system" is defined as a generation system that is designed to serve as a backup in the event of a temporary failure or interruption in the flow of power from the primary electricity source or utility distribution grid.

In most cases, an applicant submits a Reservation Request Form (CEC-1038 R1) and supporting documentation to reserve a fixed amount of program funds. For fuel cell systems, a CEC-1038 R1 A form is also required to verify the eligibility and use of renewable fuel. Once the Reservation Request Form is reviewed and approved, the Energy Commission sends the applicant a Payment Claim Form (CEC-1038 R2) that identifies the amount of funds reserved and the date upon which the reservation expires. The applicant then proceeds to install an eligible system. When the system is completed and operational, the applicant then submits the

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<sup>5</sup> Rebates are available for systems less than 30 kilowatts in size (wind systems up to 50 kilowatts in size may participate, but the rebates for such systems are limited to less than 30 kilowatts).

Payment Claim Form and supporting documentation to the Energy Commission. If the applicant installs an eligible system, meets all program requirements, and submits a completed Payment Claim Form, with supporting documentation prior to the expiration date of the reservation, the Energy Commission reviews the amount reserved and the incentive the applicant is eligible to receive and makes the appropriate payment.

For forms or additional information, contact the Energy Commission's Call Center at: (800) 555-7794 or go to [[www.consumerenergycenter.org/erprebate/forms.html](http://www.consumerenergycenter.org/erprebate/forms.html)].

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## II. Program Eligibility Requirements

Effective January 1, 2007, two technologies are eligible for ERP funding. They are the following:

1. Small Wind Turbines - small electricity-producing, wind-driven generating systems with a rated electrical generating capacity no greater than 50 kilowatts;
2. Fuel Cells - technologies that generate electricity through an electrochemical reaction using a renewable fuel, with a generating capacity not greater than 30 kW. For purposes of fuel cell eligibility, "renewable fuel" is limited to the following:

a) Landfill gas, digester gas, and other gases that meet the definition of an "eligible renewable energy resource" as defined in Public Utilities Code section 399.12(c) with reference to Public Resources Code section 25741(b).

b) Hydrogen or hydrogen rich gases derived from a non-fossil fuel or feedstock through the use of power generated by an "eligible renewable energy resource."<sup>6</sup>

In addition, fuel cell technologies must meet additional eligibility requirements of Public Resources Code section 25744(b)(3) which identifies "fuel cell technologies with an emission profile equivalent or better than the State Air Resources Board 2007 standard."

Systems that use the above technologies must satisfy the following eligibility criteria as explained in this chapter. Other technologies may be added to this category if they meet the criteria identified in Appendix 3 to the Energy Commission's satisfaction.

### A. System Ownership

Eligible renewable energy systems may not be owned by an electrical corporation as defined in Public Utilities Code section 218, or by a local publicly owned electric utility as defined in Public Utilities Code section 224.3.

### B. System Location

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<sup>6</sup> An example of a renewable fuel is hydrogen derived from water through an electrolysis process energized with electricity generated by a solar photovoltaic system. In this example, the hydrogen is derived from water (a non-fossil fuel or feedstock) through a process energized with electricity from an eligible renewable energy resource (a solar photovoltaic system). The electricity used to energize the process must be bundled with the associated renewable attributes, so that renewable energy is used to produce the hydrogen. If the renewable attributes are unbundled from the electricity and disposed of separately, the hydrogen will be produced with null power and will not be considered a renewable fuel for purposes of fuel cell eligibility under the ERP.

The renewable energy system and eligible renewable energy resource must be located on the same site where the customer's own electricity demand is located. To meet this requirement a fuel cell system and its renewable fuel storage tank must be installed at the site where the customer's own electricity demand is located. However, the renewable fuel may be produced at another location and transported to the customer's site.

## **C. Grid Interconnection**

The renewable energy system must be permanently interconnected to the electrical distribution grid of the utility serving the customer's electrical load. This requirement does not apply to fuel cell systems used for backup generation for emergency, safety, or telecommunication purposes.

Portable systems are not eligible. The site where the system is installed must receive electrical distribution service from PG&E, SCE, SDG&E, or BVE. The system's interconnection to the electricity distribution system must also comply with applicable electrical codes and utility interconnection requirements.

## **D. System Components**

The major system components must be certified or approved as described in Appendix 3. Approved major components are on the Energy Commission's lists of eligible equipment and are available at [\[www.consumerenergycenter.org/erprebate/equipment\]](http://www.consumerenergycenter.org/erprebate/equipment).

The applicant should confirm that the components purchased for a system are eligible when applying for ERP funding. Energy Commission staff will confirm that equipment identified in a reservation application meets eligibility requirements prior to an application being approved. However, if the applicant begins or completes the installation before the Energy Commission has approved the reservation, equipment lists may have changed, and significant and costly changes may be needed for the system to comply with the eligibility criteria.

## **E. New Equipment**

All major system components (requiring certification per section C) must be new and must not have been previously placed in service in any other location or for any other application. Equipment purchased or installed more than 18 months before applying for a reservation is not eligible.

## **F. System Sized to Offset On-site Electricity Load**

For all eligible systems, regardless of technology, the system must be sized so that the amount of electricity produced by the system primarily offsets part or all of the customer's electrical needs at the site of installation. The expected production of electricity by the system may not be



more than the historical or expected electrical needs of the electricity consumer at the site of installation. See Appendix 4 for further details on how to determine the maximum allowed system size.

## **G. System Installation**

All systems, if installed under contract, must be installed by appropriately licensed California contractors in accordance with rules and regulations adopted by the State of California Contractors State Licensing Board. Installation contractors must have an active A, B, or a C-10 license.

Systems may also be self-installed by the purchaser (owner). While such installations are eligible for funding without the licensing requirements listed, they will be eligible only for a lesser rebate as described in Chapter III.

In all cases, systems must be installed in conformance with the manufacturer's specifications and with all applicable electrical and building codes and standards.<sup>7</sup>

## **H. Five-Year Warranty Requirements**

All systems must have a minimum five-year warranty to protect the purchaser against system or component breakdown. The warranty must cover, and provide for no-cost, repair or replacement of the system or system components including any associated labor for five years. The warranty must also cover the major components of the generating system against breakdown or degradation in electrical output of more than 10 percent from their originally rated electrical output during the five-year period. Major components are defined as wind turbine generators, fuel cell reformers and fuel cells, fuel processing and storage systems, and inverters. The warranty may be provided in combination by the manufacturer and installer.

Self-installed systems must have a minimum five-year warranty to protect the purchaser against breakdown or electrical output degradation of major system components. In this case, the warranty need not cover the labor costs associated with removing or replacing major components, because any repairs would be done by the self-installer or at the self-installer's expense.

## **I. System Performance Meter**

All systems must be installed with a performance meter<sup>8</sup> so that the customer can determine the amount of energy produced by the system. The meter must be listed with the Energy

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<sup>7</sup> For information on restrictions placed on owner-builders or self-installers, contact the Contractors State License Board at (800) 321-CSLB to obtain a current edition of the *Contractor's License Law and Handbook*.

Commission and measure the total energy produced by the system in kilowatt hours (or watt hours) and have a manufacturer's uncertainty specification of  $\pm 5$  percent. The meter must retain the kilowatt-hour production data in the event of a power outage and must provide a display of system output that the customer can easily view and understand. A system need not include a separate meter if the system is installed with an inverter that contains internal metering and display equipment that meets the meter requirements above. The meter requirement also applies to system additions if the existing system does not include a performance meter. A list of eligible performance meters and inverters that have built-in meters is available at [www.consumerenergycenter.org/erprebate/equipment.html](http://www.consumerenergycenter.org/erprebate/equipment.html).

## J. Equipment Sellers/ Installers

To participate in the ERP, companies that sell and/or install system equipment must be self-registered on the Energy Commission's Contractors, Installers, and Sellers Database. Equipment sellers/installers should have the following information available prior to self-registration:

1. Business name, address, phone, fax, and e-mail address
2. Owner or principal contact
3. Business license number
4. Contractor license number (if applicable)
5. Proof of good standing on the records with the California Secretary of State, as required for corporate and limited liability entities
6. Reseller's license number

**This information must be submitted to the Energy Commission through the self-registration process before a company can become eligible to participate in the ERP. To remain eligible, this information must be resubmitted annually by March 31.**

Self-registration can be done on-line at:

<http://gosolarcalifornia.ca.gov/database/addcompany.php>.

Sellers, contractors, or installers that are listed in the online Database should maintain their information on a regular basis. This can be done using the log-on account name and password provided when the company has registered. Updates can be done online at:

<http://www.gosolarcalifornia.ca.gov/database/updates.php>

The Energy Commission will send out emails periodically to remind companies to update their online information, contacts, and other data.

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<sup>8</sup> A performance meter is a device which measures and displays the energy output of the renewable energy system.

It is the responsibility of each company to maintain its online information. If the Energy Commission's e-mails are returned as undeliverable, and the Energy Commission cannot reach that company by phone or by regular U.S. mail, the Energy Commission reserves the right to remove the company from the online database after a three-month period.

The above information must be on file with the Energy Commission before the applicant can receive any reservation confirmation or payment. The Energy Commission will compile the information and make it available to consumers to assist them in making purchase decisions and effectuating remedial action. Information about registered equipment sellers will be posted on the Energy Commission's website at

[\[www.gosolarcalifornia.ca.gov/retailers/search-new.php\]](http://www.gosolarcalifornia.ca.gov/retailers/search-new.php).

**Payment requests must be mailed, but reservation requests, and responses to Energy Commission correction requests may be faxed.**

## **K. Audits and Inspections**

The Energy Commission will conduct audits of the applications it receives to verify that the information provided in the applications is true and correct. The Energy Commission may also conduct field inspections to verify systems are operating properly and installed as specified in the reservation request and payment claim applications.

In the event that a contractor, equipment seller, or purchaser provides information in a reservation application or payment request that appears to be questionable, the Energy Commission may take the following steps to clarify the questionable information:

1. Stop review of the application containing the questionable information to investigate further.
2. Require additional documentation from the contractor, equipment seller, and/or purchaser to verify the accuracy of the questionable information.

If the questionable information appears to be false or misrepresented, the Energy Commission will take one or more of the following corrective measures:

1. Reject the reservation application, or if a payment application, reject the payment request and cancel the reservation.
2. Notify the proper authorities, including the Contractors State Licensing Board, so appropriate enforcement action may be taken.
3. Suspend review of all other applications submitted by or associated with the contractor, equipment seller, or purchaser to review whether false or misrepresented information was provided in those applications.



4. Require additional documentation from the contractor, equipment seller, or purchaser to verify if false or misrepresented information was provided with these other applications.
5. Notify purchasers identified in these other applications that additional information will be required to keep approved applications active or to process payment requests, and that the processing of any such applications will likely be delayed.
6. Require supporting documentation for all new applications and payment requests submitted by or associated with the contractor or equipment seller.
7. Require that all payment requests submitted by or associated with contractor, equipment seller, or purchaser be supported by additional verification of payments made by the purchaser, including bank statements, cancelled checks, credit card statements, or other similar documentation.
8. Post information on the Energy Commission website which informs consumers that:
  - 1) Additional information is required when applying for reservations or payments using the contractor or equipment seller, and
  - 2) Any applications submitted by or associated with the contractor or equipment seller will be subject to a more thorough review which will delay the processing of these applications.

### III. Incentives Offered Through This Program

#### A. Rebates Offered

The rebates offered through this program are based on the generating capacity of a system and vary by system size, technology, and type of installation. The incentive must be used to reduce the purchase or lease cost of the eligible system, or the cost of electricity produced by the eligible system for the on-site customer.

The rebates offered for professionally installed new systems are identified below in Table 1. A 15 percent lower rebate is also available for self-installed systems. Additionally, special rebates may be available for systems installed for affordable housing. Because these special rebates target specific groups or classes of customers, they are discussed separately in Chapter VIII of this Guidebook. Under no circumstance will the incentive from the ERP exceed the net purchase price of the system to the final customer (before ERP incentives).<sup>9</sup>

Table 1 lists the rebate levels available as of April 7, 2010, by size category and technology type. The rebate level for the first 10 kW of a small wind system is \$3.00 per watt through April 6, 2011, and will revert to \$2.50 per watt on April 7, 2011. The Energy Commission will conduct a review on the adequacy of the rebate level before April 7, 2011.

**Table 1: Rebates Available for Emerging Renewable Systems**

Technology Type	Size Category	Rebate Offered
Fuel Cells using a renewable fuel	<30 kW	\$3.00 per watt
Wind	First 10 kW	\$3.00 per watt through April 6, 2011 \$2.50 per watt beginning April 7, 2011
	Increments between > 10 kW and <30 kW	\$1.50 per watt

<sup>9</sup> The net system price is based on the system's eligible costs as described in Chapter VII of this guidebook.

## **B. Other Incentives May Affect Rebate Amount**

The rebate amount received from the Energy Commission may be reduced for applicants who receive incentives from sources other than the ERP that lower the cost of a generating system. No less than 5 percent of incentives received or expected must be subtracted from the rebate amounts listed in Table 1 if the applicant receives incentives from other utility incentive programs, a State of California sponsored incentive program, or a federal government sponsored incentive program, other than tax credits. The percent reduction will be increased as necessary to ensure the sum of all incentives received or expected from all sources, including the ERP, does not exceed the total cost of the system. No applicant may be issued a reservation or receive payment from the ERP for any system or portion of a system that has received payment from the Energy Commission's New Solar Homes Partnership, California Public Utilities Commission-approved Self-Generation Incentive Program or California Solar Initiative, the Rebuild a Greener San Diego program, or any other rebate program using electric utility ratepayer funds, or that is participating in and eligible to receive payment under such programs.

See Chapter VIII of this guidebook for information regarding rebate levels for qualifying affordable housing.

## **C. Adjustment of Rebate Levels**

The rebate levels for all technology types, over time, may be periodically reduced and will be included in future editions of the *ERP Guidebook*.



## IV. Reservation Process

Through this program, funding is reserved for applicants who have committed to purchase and install an eligible system at a given site. A funding reservation provides the purchaser assurance that the reserved funds will be available when the payment claim is made. The standard reservation period is for 12 months. The reservation period for systems installed on public and charter schools and new construction is 18 months. Multiple systems at each site are treated as a single system for purposes of determining the appropriate rebate. The site is defined as a single parcel of real property plus any improvements on that site.

In cases where multiple systems are installed, all generating capacity on the site is treated as a single system. For example, a 5 kW renewable energy system and a 3 kW renewable energy system on the same property are treated as a single 8 kW system for purposes of reserving funds and calculating the rebate payment. However, in cases where there are five or more high density dwelling units, such as condominiums or apartments on a single parcel, utility meter numbers will be used to determine the number of reservations that may be granted for systems installed at the site. For example, an apartment complex comprised of five separate apartments each with its own designated electric utility meter is eligible to receive five separate reservations up to a maximum of 30 kW each.

Applicants with an 18-month reservation period cannot reapply for a new reservation during the term of their original reservation period. These applicants may reapply for a new reservation only after the term of their original reservation period expires, and may qualify for rebate levels available at that time.

Funding reservations are made only for complete applications on a first-come, first-served basis. Applications that are missing application forms or have omissions or discrepancies will not be approved or processed. The applicants that submitted these applications will be notified and directed to submit new applications if interested in applying for program funding. The applications that are rejected will normally be kept by the Energy Commission for approximately three months after being rejected. In the case of omissions that do not affect eligibility or the amount reserved, the purchaser and equipment seller may be asked to provide additional information to clarify the application.<sup>10</sup> If additional information is requested, the application will not be processed unless the requested information is provided within the time period specified in the request (usually 30 days). If the requested information is not provided within the time period specified in the request, the purchaser will be notified to reapply as specified above.

No payment will be made unless the installed system meets all applicable ERP requirements even if funds are reserved.

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<sup>10</sup> Examples of omissions that do not affect eligibility include situations where the required information is provided in an application, but the information is not legible, or where pertinent information is missing from an application's supporting documentation, as in the case of a partial utility bill that does not clearly specify a street address.

Only one reservation and one rebate payment will be allowed for each site with a standard 12 month reservation period.<sup>11</sup> The application information and funding reserved can be modified (except for the reservation expiration date) within that 12- month reservation period with supporting documentation and if sufficient funds are available.

## **A. Reserving a Rebate**

This section describes the paperwork that is normally required to reserve funding for a standard rebate. Please be sure to submit a complete reservation application and provide all the supporting documentation as described below to receive your reservation approval. The application will not be reviewed if incomplete and will be rejected. The reservation process will be delayed if incorrect or non-complying information is received. To obtain a rebate reservation, all applicants must submit at minimum the following items:

- A completed Reservation Request Form (CEC-1038 R1)
- Copy of agreement(s) to purchase and install a system
- Evidence that site electricity load is supplied by an eligible utility
- Payee data record (Form STD-204) for the rebate recipient
- For fuel cell systems, a completed Fuel Cell Supplemental Informal Form (CEC-1038-R1A) is required.

Please see Chapter V for the documentation requirements to claim a rebate payment.

Chapter VIII covers the special funding requirements for the rebates offered for affordable housing. Appendix 5 covers new construction, systems installed on property owned by retailers and/or contractors, adding to existing systems, and systems that are leased by the end-use customer or provide electricity to the end-use customer under a power purchase agreement.

### **1. Reservation Request Form**

The Reservation Request Form (CEC-1038 R1) is a form that identifies most of the information needed about the proposed system and specifies what information must be submitted with the application.

The purchaser of the system must always sign the Reservation Request Form. If the equipment seller is designated as the payee, the seller (retailer or wholesaler) must also sign the Reservation Request Form. The purchaser must use a registered equipment seller. A listing of registered equipment sellers may be found at [\[www.gosolarcalifornia.ca.gov/retailers/search-new.php\]](http://www.gosolarcalifornia.ca.gov/retailers/search-new.php).

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<sup>11</sup> An applicant with a standard reservation may only cancel his or her reservation and reapply for a new reservation within the original 12-month reservation period if the rebate level has dropped at least one level from the rebate granted in the original reservation. A letter explaining the request must be submitted with a new reservation request form and signed by the purchaser and seller.



Eligible equipment sellers need to have registered online with the Energy Commission to be eligible to participate in the program. Reservation requests that identify ineligible retailers will not be approved unless the required business information is filed with the Energy Commission. Please refer to Section J of Chapter II for registration details.

Detailed instructions are included with the Reservation Request Form (CEC-1038 R1). These instructions also provide information on how the rebate is calculated when the rated system output exceeds the inverter(s) capacity. Appendix 1 includes a blank copy of the Reservation Request Form and accompanying instructions. To obtain additional blank forms, call the Energy Commission Call Center at (800) 555-7794 or download the forms online from the following Energy Commission website [[www.consumerenergycenter.org/erprebate/forms.html](http://www.consumerenergycenter.org/erprebate/forms.html)].

## **2. Evidence of Agreement to Purchase and Install a System**

Evidence of an agreement(s) to purchase and install a system must be demonstrated. How this is demonstrated depends upon whether the system is 1) owner-installed; 2) contractor-installed where the equipment seller is a separate entity; or 3) contractor-installed where the contractor is also the equipment seller.

In each of these three cases, information concerning the contractual agreements must be provided in the Reservation Request Form (CEC-1038 R1) and must be consistent among agreements and with the Form, or the application may be rejected. Regardless of the situation, agreements for the purchase of a system or system equipment must be in writing and clearly include, at a minimum, the following information:

1. The quantity, make and model number (as shown on the Energy Commission lists of eligible equipment) for the inverters, system performance meters, wind turbines or other generating equipment, including fuel cell systems.
2. The total purchase price of the system before applying the rebate.
3. **Language** indicating the purchaser's commitment to buy the system.
4. Printed names and signatures of the purchaser and equipment seller's authorized representative.

Installation contracts must comply with the Contractors State License Board (CSLB) requirements. In addition, these contracts must contain the following information:

1. Name, address and contractor's license number of the company performing the system installation.
2. Site address for the system installation.



3. Description of the work to be performed.
4. Total agreed price to install the system.
5. Payment terms (payment dates and dollar amounts).
6. Printed names and signatures of the purchaser and the company's authorized representative.

Please refer to the CSLB website for more information on CSLB guidelines at [\[www.cslb.ca.gov\]](http://www.cslb.ca.gov).

Applications with installation contracts that appear to be deficient may be forwarded by the Energy Commission to the CSLB for verification. Entities without a valid A, B or C-10 contractor's license may not offer installation services or charge for installation in any agreement.

The above requirements are sufficient evidence of an agreement to purchase and install a system for the case where a contractor sells and installs the system. For the other two cases, the following case-specific requirements must be satisfied:

A. Owner or Self-Installed System

In situations where the system is installed by the system owner, the applicant must provide the following information:

- An equipment purchase agreement as described above, OR
- In cases where there is not a signed agreement to purchase equipment the purchaser may provide invoices or receipts showing that at least 10 percent of the system equipment purchase price (generating equipment and inverters) has been paid to the seller(s).<sup>12</sup>

B. Professionally Installed System with Separate Seller and Installer

In situations where the purchaser is purchasing the system from one company and hiring a separate company (licensed contractor) for installation, the purchaser must obtain proof of his or her commitment to purchase and install the system in separate documents as follows:

- An equipment purchase agreement as described above, OR
- In cases where there is not a signed purchase agreement the purchaser may provide invoices or receipts showing that at least 10 percent of the system equipment purchase price (generating equipment and inverters) has been paid to the seller(s), AND
- An installation contract from the second company as described above.

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<sup>12</sup> An example of this situation is where the purchaser buys new equipment via the Internet or mail order.

### **3. Evidence That Site Electricity Load Is Supplied by an Eligible Utility**

If the installation location currently has electrical service, the applicant must submit a recent copy of the utility bill showing the service address of the installation site, the name of the applicant, electric energy usage, and the utility name. Submit all pages of a utility bill to ensure that this information is provided. **The utility bill should be no older than six months from the date of application.** If the customer name on the utility bill is not the same as the applicant's, provide an explanation. This or other documentation must show that the annual on-site electrical load justifies the proposed system size before payment will be made (see Appendix 4).

**Exception only for new construction** - If the installation location is a new facility without electrical service, the applicant must identify on the Reservation Request Form (CEC-1038 R1) the electric utility that will provide electric service to the site. Documentation to show that the annual on-site electrical load justifies the system size will need to be provided before payment will be made. (See Appendix 4 for program requirements for on-site electrical loads. See also Appendix 5, Section A for additional requirements.)

### **4. Payee Data Record (Form STD-204)**

This form must be completed by the person or business entity identified as the rebate payee on the Reservation Request Form (CEC-1038 R1). The payee data record is still required even if the rebate payee chooses to assign the payment to another party. If the designated payee has submitted a complete STD-204 form with a prior application and has already received a rebate payment within the last two years from the Energy Commission, a new STD-204 is not needed again. In these cases the Energy Commission will use data from the previously submitted STD-204 form. If the data provided in a previously submitted STD-204 has changed, the payee must notify the Energy Commission and submit a new STD-204 form.

### **5. Submitting Your Complete Reservation Application**

The complete reservation request application must be delivered by FAX to (916) 653-2543 or by mail to:

ERP Reservation Request  
California Energy Commission  
1516 - 9th Street, MS-45  
Sacramento, CA 95814-5512

If the application is mailed close to a scheduled rebate level decline, it must be postmarked no later than the last day before the decline to be considered for the higher rebate level. No funding will be reserved if an application is incomplete or illegible, has conflicting information or does not otherwise comply with the program requirements. The application will be approved for a reservation based on the date it is deemed complete and not the date it was first submitted. The

rebate level and other program criteria applicable on the date the application is deemed complete will apply.

As described earlier in this chapter, if the reservation request application is missing required forms or has other omissions or discrepancies, the purchaser will be notified that the application will not be approved. Any new application will be subject to the program requirements and funding availability. **Applicants are strongly encouraged to keep copies of all applications and supporting documentation submitted to the Energy Commission.**

The available rebate amount may change during the term of the program. Therefore, the Energy Commission recommends that applicants wait to install system equipment until after they receive a confirmation indicating the amount of funding that has been reserved for their rebate.



## **V. Payment Process**

### **A. Claiming a Rebate Payment**

To receive rebate payment, all program requirements must be in compliance and a complete claim for payment must be made before the expiration of the reservation.

#### **1. Payment Claim Form**

The Energy Commission will send a copy of the Payment Claim Form (CEC-1038 R2) to the purchaser and designated payee to confirm the amount of funding reserved on the purchaser's behalf. In most cases, the parties entering into the purchase and installation agreement(s) (purchaser and equipment seller and/or installer) must read, sign, and date the Payment Claim Form. If the purchaser alone applied for and is to receive the rebate, only the purchaser needs to sign the Payment Claim Form. This form must be returned to the Energy Commission by mail, as original signatures are required to process a payment. Please sign the form so that it is clear the signatures are original. Signing in black ink can make it difficult to distinguish whether the signature is original or a copy. In some cases, a new form with clearly original signatures may be requested. Stamped signatures are not acceptable.

Any changes to the information provided on the previously submitted Reservation Request Form (CEC-1038 R1) must be noted in the space provided on the Payment Claim Form (CEC-1038 R2). Changes from the previously submitted Reservation Request Form, such as changes in equipment, installer or equipment seller must be identified on the Payment Claim Form. If additional space is required to note such changes, additional pages may be attached to the Payment Claim Form. Changes in equipment from that identified in the previously submitted Reservation Request Form or other changes may affect the eligibility and amount of the rebate.

#### **2. Documentation Confirming Final Payment and System Installation**

Applicants must submit final system cost documentation clearly identifying the final amount paid or legally incurred to purchase the system and the final amount paid to install the system. The cost documentation must provide proof of the final amount paid or legally incurred by the applicant to the equipment seller and/or installer and provide sufficient information to clearly identify the equipment purchased and the labor paid. The final amount paid or legally incurred to the equipment seller and/or the final amount paid to the installer must match the cost information identified in the Payment Claim Form (CEC-1038 R2). To meet this requirement, the applicant must submit final invoices or a copy of the final agreement. The actual amount paid or legally incurred by the purchaser to the equipment seller and/or the actual amount paid to the installer must be clearly indicated. If there is no direct proof of actual payment from the applicant to an appropriately licensed installer, the rebate will be reduced to the owner-installed rebate level.

In addition, the final invoices or agreements should clearly indicate the extent to which the Energy Commission's rebate lowered the cost of the system to the applicant. If the applicant has entered into an agreement to pay the equipment seller over time rather than in lump sum, the final agreement must indicate the terms of payment and the amount of any deposits or payments paid by applicant to the equipment seller to date. The cost of any system installation must be paid by the applicant prior to submitting a payment request to the Energy Commission.

The Energy Commission will conduct spot checks to verify that payments were made as identified in the final invoices or agreements provided by equipment sellers and/or installers. As part of these spot checks, the Energy Commission will require applicants to submit copies of cancelled checks, credit card statements, or equivalent documentation to substantiate payments made to the equipment seller and/or installer. (When submitting this documentation, applicants are encouraged to remove their personal account numbers or other sensitive information identified in the documentation.) Applicants must explain the difference if the final amount paid by the applicant is different from the amount of the purchase or installation shown in any agreement or invoice or in the previously submitted Reservation Request Form (CEC-1038 R1).

### **3. Final Building Permit and Final Inspection Sign-Off**

Applicants must submit a copy of the building permit and the final inspection signoff for the system installation. The name and address on the final building permit and final inspection signoff must match the name and address shown on the Payment Claim Form (CEC-1038 R2) as well as the previously submitted Reservation Request Form (CEC-1038 R1).<sup>13</sup>

### **4. Five-Year Warranty**

A standard full five-year warranty form (CEC-1038 R3) must be completed and signed by the appropriate party(ies) and given to the purchaser. Submit a copy of this form with the Payment Claim Form (CEC-1038 R2) to claim the maximum incentive. If the applicant is unable to obtain warranty coverage for labor, the application will be treated as an owner installed system and will receive a rebate amount 15 percent lower.

**Exception for owner installed systems** - Submit copies of the manufacturer's five-year warranties for the inverters and generating equipment.

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<sup>13</sup> Instead of a building permit and final inspection signoff, public schools, community colleges and public buildings subject to the jurisdiction of the Department of General Services, Division of the State of Architect (DSA), must submit documentation from DSA confirming either compliance with DSA standards, or an exemption from DSA standards.



## **5. Evidence That Site Electricity Load Is Supplied by an Eligible Utility**

If the site of installation was a new facility without electrical service when the reservation request was submitted, a copy of the applicant's utility statement or other proof from the utility must be submitted before payment can be made. Other proof may include written confirmation from the utility that a meter has been installed at the site and verifying that the site had electrical service prior to the expiration of the reservation. In addition, if an electric utility bill is not provided, the applicant must provide a separate letter from a qualified architect, engineer, or electrical contractor (C-10-licensed) that identifies the expected electricity consumption at the site and verifies that the consumption will satisfy program requirements for system size.

## **6. System Interconnection With Utility Grid**

The applicant must demonstrate that the system is interconnected to the utility distribution grid and that the utility has approved this interconnection for the system's operation at the site of installation. The applicant must demonstrate this by submitting from the utility a letter of authorization to interconnect the system.

Backup generation systems are exempt from the above requirements, unless they are serving grid-connected electrical loads.

By applying for program funding, purchasers authorize the Energy Commission during the term of the ERP to exchange purchaser information with the purchaser's utility in order to verify compliance with program requirements, including requirements for system interconnection to the utility grid.

## **7. Renewable Fuel Supplier Attestation**

A Renewable Fuel Supplier Attestation (CEC-1038 R2A) is required for all fuel cell systems to verify the eligibility of the renewable fuel that will be used in the system. Fuel cell systems that use a non-renewable fuel, such as hydrogen produced from natural gas or other fossil fuels or produced through a process energized with power from a non-eligible renewable energy resource, are not eligible for funding under the ERP. In many, if not all cases, the purchaser of the fuel cell system will have no control over how the fuel for his or her system is produced. For this reason, the supplier of the renewable fuel must provide an attestation to verify that the fuel supplied to the purchaser meets the criteria for "renewable fuel" specified in Chapter II of the guidebook.

As discussed in Chapter II, electricity from an eligible renewable energy resource may be used to make renewable fuel only when the electricity is bundled with the associated renewable attributes, so that renewable energy is used to produce the fuel. If the renewable attributes are unbundled from the electricity and disposed of separately, the fuel will be produced with null



power<sup>14</sup> and will not be considered a renewable fuel for purposes of fuel cell eligibility under the ERP.

## **8. Payee Data Record (Form STD-204)**

If the data provided in a previously submitted STD-204 has changed, the payee must notify the Energy Commission and submit a new STD-204. If the payee originally identified has changed, a STD-204 form must be submitted (if the new payee was not previously paid by the Energy Commission). The STD-204 form may be found in Appendix 1 of this guidebook.

## **B. Submitting a Payment Claim**

Once a system is installed, grid-connected<sup>15</sup> and operating satisfactorily, the following documents must be submitted to claim a rebate payment:

- Rebate Payment Claim Form (CEC-1038 R2).
- Documentation confirming what equipment and labor was purchased including the final amount(s) paid to purchase and install the system.
- Final building permit and final signoff.
- Five-year warranty for the system and labor, if applicable (CEC-1038 R3 form).
- If not already provided, a copy of a recent utility bill (or in the case of a new home or facility, other proof of utility service and expected electricity consumption at the site).
- A copy of the utility letter authorizing interconnection to utility grid.
- For fuel cell systems, a Renewable Fuel Supplier Attestation (CEC-1038 R2A).
- Payee data record (STD-204), if not provided with the initial application or the payee was not previously paid by the Energy Commission within the last two years.
- Payment Assignment Form (CEC-1038 R5) with wet signature, if the designated payee is assigning payment to another individual or entity.

Mail the complete Payment Claim Form (CEC-1038 R2) and supporting documentation to the Energy Commission at the address shown below on or before the expiration date specified on the Payment Claim Form. The Payment Claim Form cannot be submitted by FAX as original signatures are required on the Payment Claim Form to process rebate payments. The request for payment must be received or postmarked on or before the reservation expiration date. Be sure to keep a copy of the Payment Claim Form together with the purchase and installation agreements, contracts, receipts, evidence of payment, building permit and final signoff, utility bill, etc. for your records. If the payment is being assigned to a third party, an original signature of the payee is also required on the Payment Assignment Form (CEC-1038 R5).

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<sup>14</sup> Null power refers to renewable energy that has been stripped or unbundled from its renewable attributes. These renewable attributes may be disposed of separately.

<sup>15</sup> This does not apply to backup generation systems, unless the systems are serving grid-connected electrical loads.

Payment Claim Forms should not be submitted unless a complete application can be provided and all eligibility requirements can be met. The application must document that utility service existed at the site and that the system's installation was signed off by the building department prior to the expiration date of the applicant's reservation, otherwise the system does not meet the conditions of the reservation and the applicant will be required to reapply under the program rules and funding availability in effect at the time of reapplication.

If the payment request application is incomplete, the Energy Commission may request the provision of all missing or unclear information from the appropriate party (purchaser, equipment seller, or installer) to process the request. In that event, the Energy Commission will allow the submitting party up to 60 days to respond with all the required information to approve payment.

The request for payment will be denied if all the requested information is not received within the time period specified by the Energy Commission. Participants submitting a claim that is not received by the expiration date of the applicant's reservation or is otherwise ineligible will be sent a written notice stating the reasons why the claim was rejected. If the claim is made after the expiration date of the reservation or is otherwise ineligible, the applicant may reapply for a rebate reservation, but will be subject to the eligibility requirements, incentives, and funding available at that time of reapplication.

All required forms and supporting documentation required to claim payment shall be mailed to:

ERP Payment Claim  
California Energy Commission  
1516 9th Street, MS-45  
Sacramento, CA 95814- 5512

The Energy Commission intends to make incentive payments within 6 to 8 weeks of receipt of a complete rebate payment claim application. Payment will be made to the seller or purchaser, as designated on the Reservation Request Form (CEC-1038 R1), unless the payee has assigned the payment to a third party, and will be mailed to the address provided by the recipient on the Payee Data Record (Form STD-204), previously submitted to the Energy Commission.

## **C. Claiming a Rebate Payment Without a Prior Reservation**

If a rebate payment is claimed for a system not previously approved for a rebate reservation, the Payment Claim Form (CEC-1038 R2) and required documentation must also be accompanied by a completed and signed Reservation Request Form (CEC-1038 R1). The submittal should meet all requirements needed for approval and payment as described herein. Applicants without a prior reservation should be aware that program eligibility requirements and rebate levels may have changed since installation and may require the applicant to make significant and costly changes to the system in order for it to qualify for an incentive.

## **D. Assignment of Rebate Payment**

The designated payee of the rebate payment may assign his or her right to receive the payment to a third party by completing the Reservation Payment Assignment Form (CEC-1038 R5) and submitting it with the Payment Claim Form (CEC-1038 R2). The Reservation Payment Assignment Form may not be submitted by FAX as original signatures are required to process the assignment. Payees that assign their rebate payment to a third party will still be reported as the recipients of said payments for tax purposes.



## **VI. Modifications or Changes to Reservations**

### **A. Can Installed System Be Different Than Reservation?**

The Energy Commission expects a system to be installed as described in the Reservation Request Form (CEC-1038 R1), but recognizes that minor changes may result during installation. Minor changes do not require prior approval, but must be documented on the Payment Claim Form (CEC-1038 R2) and may change the rebate amount. Minor changes include decreases in the system size (while staying within the Energy Commission size categories), changes in the equipment seller and/or installer, and changes from one make or model of a certified system component to another. Any changed rebate amount that occurs is subject to availability of funding.

#### **1. How Do Changes Affect the Rebate Amount?**

Modifications to an approved reservation may be made prior to a payment claim or when the complete payment claim is submitted. When a modification includes parameters that affect incentive amounts, a new incentive amount will be calculated and the calculation will be based on the program parameters at the time a modification request, with supporting documentation, is deemed complete. Parameters affecting the incentive include the installation type, system size, and technology. If any change results in the installed system differing in its rated electrical output or other parameters from the system originally specified in the Reservation Request Form (CEC-1038 R1), a new rebate payment amount will be calculated.

If any change occurs that would have decreased the original rebate calculation, the amount reserved will also be decreased by the same factor. For example, if the installed system is smaller in output than originally specified in the Reservation Request Form, the new rebate amount will be determined by prorating the amount reserved downward (using the same rebate level that was used to calculate the original rebate amount).

Any change that may result in a higher incentive will be recalculated and either reserved or paid without requiring a new application to be submitted. If a system's total calculated capacity is increased in size, the incremental increase in capacity will be calculated at the rebate level available at the time the modification request was made. Similarly, if the installation type changes from a professional install to an owner-install, the incentive is reduced by 15 percent.

The amount reserved will be increased if the incentive calculated for the entire proposed project is higher than the amount already reserved, provided there is adequate ERP funding for the increased rebate amount. The Energy Commission may not be able to increase the rebate amount reserved if no additional funds are available. See Appendix 5 for additions to existing systems.

**Table 2: Example Rebate Payment Calculations**

<i>Description of application information and resulting rebate calculations after changes are made</i>	<i>Rebate Calculation</i>	<i>Total Rebate</i>
<b>Base Case – Funding reserved for a 10,000 watt wind system installed by contractor with a \$3.00/watt and \$1.50/watt rebate level</b>	$(10,000 \times \$3.00) =$	<b>\$ 30,000</b>
Change to owner install during <b>\$3.00/watt and \$1.50/watt</b> rebate level with no other changes to base case (owner-installed systems receive 85% of full rebate)	$(10,000 \times \$3.00) \times .85 =$	\$25,500
Add 1,000 watts during <b>\$3.00 and \$1.50</b> rebate level with no other changes from base case	$(10,000 \times \$3.00) + (1,000 \times \$1.50) =$	\$31,500
Add 1,000 watts and change to owner install at <b>\$3.00 and \$1.50</b> rebate level	$(10,000 \times \$3.00) + (1,000 \times \$1.50) \times .85 =$	\$ 26,775
Reduce size by 500 watts during <b>\$3.00 and \$1.50</b> rebate level *	$(9,500 \times \$3.00) =$	\$ 28,500

\*The above examples are for a system that was reserved funds at \$3.00/w, but then modified (increased or decreased in size) before requesting a rebate payment.

## VII. Eligible System Costs

In most cases, the system cost will not affect the eligible incentive amount, but is needed for a variety of reasons. First, the Energy Commission is interested in having information about system prices to evaluate future rebate levels and monitor whether the program goals are being achieved. **Second**, total costs are needed to assure the incentive does not exceed the net purchase price of the system.

### A. What System Costs Are Eligible?

In addition to the cost of permits issued by local building departments or appropriate government entities, the labor to install the electricity generation system and sales tax, the program covers only the following specific eligible components and equipment:

**Small Wind:** The wind turbine, tower, wire, inverter, foundation (for free standing systems), kWh system performance meters, and utility required interconnection equipment.

**Fuel Cells:** The renewable gas pre-treatment equipment (but not the gas collection or production equipment), fuel processor, cell stacks, fuel storage for backup unit generation, inverter and power conditioning equipment, cooling equipment, foundation (for free-standing systems), simple kWh system performance meters, and utility required interconnection equipment.

### B. What Costs Are Not Eligible?

Many of the system costs included in the purchase or installation contracts may not be eligible. The purchaser or equipment seller must provide details to separate these costs from eligible costs. The cost of any equipment used to store the electricity produced is not eligible (e.g., batteries, charge controllers, battery cables, etc.). The cost of tools is not eligible.

Other ineligible costs include items that are not typically required for the installation of an eligible system. These ineligible costs include, but are not limited to, tree trimming, fencing, re-roofing, roof repairs or reinforcement, landscaping, relocating vent pipes, and moving HVAC or other equipment. Additionally, financing fees or costs incurred by either the purchaser or the equipment seller are ineligible.





## VIII. Special Funding

### A. Special Funding for Affordable Housing Projects

Pursuant to Assembly Bill 58 (Keeley, Chapter 836, Statutes of 2002), the Energy Commission has established a higher rebate level for qualifying systems installed on affordable housing projects. Qualifying systems include systems connected to and serving the energy needs of: 1) residential units subject to affordability requirements, 2) the office and residential unit of the project manager, provided all other residential units in the project are subject to affordability requirements, and 3) the common areas of the project, such as laundry rooms and parking structures, provided all residential units in the project (except the manager's unit) are subject to affordability requirements.

Qualifying systems installed on affordable housing projects will receive a rebate 25 percent higher than the standard rebate level, not to exceed 75 percent of the system cost, if the following additional criteria are met:

- The affordable housing project was undertaken pursuant to section 50052.5, 50053 or 50199.4 of the Health and Safety Code or other affordable housing law. Applicants must demonstrate this by providing documentation that identifies the statutory basis under which the project was undertaken. In addition, the applicant must provide a copy of the regulatory agreement or approval for the project's development that identifies 1) the project, 2) the number of residential units in the project subject to affordability requirements, and 3) the applicable affordability requirements for these residential units. The regulatory agreement or approval must expressly limit residency in the affordable residential units to persons with extremely low, very low, lower or moderate income persons as defined by the Health and Safety Code section 50052.5, 50053, 50199.4, or regulations adopted by the California Department of Housing and Community Development for a period of 45 years.
- Each residential unit (apartments, multifamily homes, etc.) for which a system is being installed has an individual electric utility meter. Applicants must provide documentation from the electric utility confirming service and meter number.
- Each residential unit for which a system is being installed is at least 15 percent more energy efficient than the current standards specified in Title 24 of the California Code of Regulations or has already taken or will take measures to reduce the unit's energy use by at least 15 percent as calculated pursuant to Title 24 compliance models (usually C2R model runs). When systems are installed to serve the energy needs of a project's common areas, the entire affordable housing project must be at least 15 percent more energy efficient than the current standards specified in Title 24 of the California Code of Regulations or must have already taken or will take measures to reduce the entire project's energy use by at least 15 percent as calculated pursuant to Title 24 compliance models. Applicants must provide the energy efficiency calculations performed by an individual certified by the California Association of Building Energy Consultants (CABEC). For a list of Certified Energy Plans

Examiners, visit the Energy Commission's website at [\[www.energy.ca.gov/efficiency/cabec\\_roster.html\]](http://www.energy.ca.gov/efficiency/cabec_roster.html).

## Appendix 1 Forms and Worksheets

CEC-1038 R1-	Reservation Request Form (All technologies)
CEC-1038 R1A -	Fuel Cell Supplemental Information Form (Fuel Cell technologies only)
STD 204 -	Payee Data Record
CEC-1038 R2 -	Payment Claim Form
CEC-1038 R2A -	Renewable Fuel Supplier Attestation (Fuel Cell technologies only)
CEC-1038 R3 -	Minimum Warranty Form
CEC-1038 R5 -	Reservation Payment Assignment Form





**R1****RESERVATION REQUEST FORM  
EMERGING RENEWABLES PROGRAM**

- ☐ Modify Existing Record # \_\_\_\_\_  
☐ Affordable Housing Project  
☐ New Construction

**1. Physical Site of System Installation**

Street Address: \_\_\_\_\_

City: \_\_\_\_\_

State: \_\_\_\_\_

Zip: \_\_\_\_\_

**2. Purchaser Name and Mailing Address**

Phone: ( ) \_\_\_\_\_

Fax: ( ) \_\_\_\_\_

**3. Equipment Seller (Must be registered)**

Company: \_\_\_\_\_

City: \_\_\_\_\_

CEC ID (if known) \_\_\_\_\_

Phone: ( ) \_\_\_\_\_

Fax: ( ) \_\_\_\_\_

**4. System Installation (Write "Owner" if not hiring contractor)**

Company: \_\_\_\_\_

City: \_\_\_\_\_

License No.: \_\_\_\_\_

Phone: \_\_\_\_\_

Fax: \_\_\_\_\_

**5. Electric Utility (Attach all pages of monthly statement)**☐ PG&E ☐ SCE ☐ SDG&E ☐ BVE

Service ID: \_\_\_\_\_

Billing Period: \_\_\_\_\_

KWh Used: \_\_\_\_\_

Note: If new construction attach building permit. Permit No. \_\_\_\_\_

**9. Declaration**

The undersigned parties declare under penalty of perjury that the information provided in this form and the R1A form, if applicable, and the supporting documentation submitted herewith is true and correct to the best of their knowledge and that the following is true:

1. All system equipment is new and unused and has been purchased within the last 18 months;
2. The generating system is intended primarily to offset Purchaser's electrical needs at the site of installation;
3. The generating system will be operated at the above site of installation for its useful life or the duration of the applicable lease agreement;
4. If the generating system is a fuel cell system, it will only use renewable fuel;
5. If the generating system is leased or provides electricity under a power purchase agreement the undersigned parties will comply with the special reporting requirements and will repay some or all of the ERP funding he or she receives if the lease agreement or power purchase agreement is terminated within five years of the system's installation or the start date of the agreement, whichever is later; and
6. The generating system will be interconnected with the distribution system of the electric utility identified above, unless the system is for backup generation that will not be serving grid-connected electrical load.

The undersigned parties further acknowledge that they are aware of the requirements and conditions of receiving funding under the Emerging Renewables Program (ERP) and agree to comply with all such requirements and conditions as provided in the Energy Commission's ERP Guidebook and Overall Program Guidebook as a condition to receiving funding under the ERP. The undersigned Purchaser authorizes the Energy Commission during the term of the ERP to exchange information on this form with the Purchaser's electric utility to verify compliance with the requirements of the ERP.

**Purchaser Signature**

Print Name: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Equipment Seller Signature**

Print Name: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Submit complete application by fax at (916) 653-2543  
or by mail to:

California Energy Commission  
Emerging Renewables Program (MS-45)  
1516 Ninth Street  
Sacramento, CA 95814-5512

**6. Equipment (Turbines, fuel cells, inverters, meters)**

	Quantity	Manufacturer, Model (see CEC lists)
Generating Equipment		
Inverters, Meters		

Estimated annual energy production \_\_\_\_\_ kWh/Year

**7. Rebate and Other Incentives**

System Rated Output \_\_\_\_\_ watts

Total System Cost: \$ \_\_\_\_\_

Expected Rebate: \$ \_\_\_\_\_

Pay Rebate to: ☐ Purchaser ☐ Seller

8. Fuel Cell System. ☐ No ☐ Yes. If yes attach completed  
R1A Fuel Cell Supplemental Information Form.

Other Incentives: \$ \_\_\_\_\_

Source/Record No.: \_\_\_\_\_

**Necessary Supporting Documentation.**

1. All pages of a monthly electric utility bill.
2. Agreements to purchase and install equipment.
3. Payee Data Record (Form STD-204) if payee identified has not previously been paid by the Energy Commission.
4. If not a standard rebate application, attach other required documentation as specified in the ERP Guidebook.
5. For fuel cell systems – A Fuel Cell Supplemental Information Form (CEC-1038 R1A).



## INSTRUCTIONS FOR THE RESERVATION REQUEST FORM (CEC-1038 R1)

Title Box: Indicate if the request is to modify an existing reservation application, is for affordable housing, or new construction.

### Section 1. Physical Site of System Installation

Provide the complete address for the site (parcel) of installation. Note that the site is the legal parcel of land on which the system is installed.

### Section 2. Purchaser

Provide the purchaser name, company name if appropriate, and complete mailing address (as it would be written on a letter to be mailed). Enter the site address information even if it is the same as the site of installation address. Also enter the phone number and fax number of the purchaser.

### Section 3. Equipment Seller Information

Provide the name of the equipment seller's company and city where located. If known also enter the CEC ID number for the seller available from the list of eligible equipment sellers [[www.consumerenergycenter.org/erprebate](http://www.consumerenergycenter.org/erprebate)] for most companies. Also enter the phone number and fax number. The equipment seller must register with the Energy Commission each year for the application to be considered. If not already registered provide a filled out Seller Registration Form (CEC-1038 R4) with the application. The seller must also sign and date the application form if the seller is the designated payee of the rebate. Enclose a copy of the purchase agreement with the application form.

### Section 4. System Installation

Identify the name of the company hired to install the system or write in "owner install" (if a contractor is not hired and paid by the purchaser to install the system, the application will qualify for a 15% lower rebate). If installed by a licensed contractor, provide the contractor's license number, phone and fax number. All contractors must have an active "A", "B" or "C-10". A standard five year warranty form (Form CEC-1038 R3) must be submitted when payment is requested for systems installed by a contractor to qualify for the full rebate amount. Enclose a copy of the signed contract with the application form.

### Section 5. Utility Bill

Identify the Purchaser's electric utility provider at the site where the system will be installed. Also identify from a monthly billing statement the service ID number, billing start and end period, and the energy usage in kWh for that monthly period. Provide all pages of the monthly billing statement with the application.

### Section 6. System Equipment (Turbines, inverters, performance meters and other)

Provide the quantity, name of the manufacturer and exact model number for the eligible equipment as identified at [[www.consumerenergycenter.org/erprebate](http://www.consumerenergycenter.org/erprebate)]. Clearly identify the generating equipment such as wind turbines in the upper section. Also identify the inverters and system performance (kWh) meters (some inverters contain eligible performance meters). Eligible generating equipment, inverters and rating information is located on the Commission's website [[www.consumerenergycenter.org/erprebate](http://www.consumerenergycenter.org/erprebate)]. Calculate and include the system output by multiplying the inverter efficiency rating by the quantity and rating of the generating equipment used.

### Section 7. Rebate and Other Incentive Information

Calculate and include the system output by multiplying the quantity of generating equipment, and the generating equipment rating in watts.

$$\text{Quantity} \times \text{Equipment Rating} = \text{System Output (watts)}$$

Provide the system installed cost (before the ERP rebate). The ERP requires that incentives from other sources be accounted for before determining the rebate from the ERP. Five percent of any incentive received or expected from a utility incentive program, a State of California or federal government sponsored incentive program, other than tax credits, must be subtracted from the ERP rebate amount requested. The "Total Request" should therefore be based on the ERP rebate level in place at the time the application is received by the Commission and the system cost after subtracting other incentives.

Check the box indicating whether the incentive is to be paid to the purchaser or seller. If any, identify incentives expected or received from other sources. If an incentive from the ERP was received previously for this site, include the incentive amount and, if known, the reservation number, for the prior application.

### Section 8. Fuel Cell Systems

Identify whether the renewable energy system is a fuel cell system. Applicants of fuel cell systems must submit a completed Fuel Cell Supplemental Information Form (CEC-1038 R1A) with their Reservation Request Form.

### Section 9. Declaration and Signatures:

The purchaser must always print and sign his or her name on the form. If the seller is designated as the payee, the seller must also sign his or her name on the form.

**Submit your request by fax (916) 653-2543 or by mail to:**

ERP, Reservation Request  
California Energy Commission  
1516 9<sup>th</sup> Street, MS-45  
Sacramento, CA 95814-5512

<b>R1A</b>	<b>FUEL CELL SUPPLEMENTAL INFORMATION EMERGING RENEWABLES PROGRAM</b>		Please submit form to: California Energy Commission Renewable Energy Program 1516 Ninth Street, MS-45 Sacramento, CA 95814-5512
<b>SUPPLEMENTAL INFORMATION</b>			
1. Expected Type(s) of Renewable Fuel To be Used by Fuel Cell System:	2. Expected Hours of Annual Operational for Fuel Cell System:	3. Expected Renewable Fuel Usage Annually (ft <sup>3</sup> , gallons):	
4. Expected Heat Input of Renewable Fuel (mmBTU/ft <sup>3</sup> or gallon of fuel):	5. Expected Onsite Storage Capacity of Renewable Fuel (ft <sup>3</sup> , gallons):	6. Renewable Fuel Supplier (Name and Address):	
7. Backup Generation. Will fuel cell system be used for backup generation? <input type="checkbox"/> No <input type="checkbox"/> Yes.  If yes, will fuel cell system provide back up generation for the following purposes?  a. Emergency <input type="checkbox"/> No <input type="checkbox"/> Yes b. Safety <input type="checkbox"/> No <input type="checkbox"/> Yes c. Telecommunication <input type="checkbox"/> No <input type="checkbox"/> Yes			
This Fuel Cell Supplemental Information Form is submitted by the undersigned parties as part of their Reservation Request Application to the Energy Commission's Emerging Renewables Program (ERP). The information provided in this Fuel Cell Supplemental Information Form is subject to the declaration provided by the undersigned parties in their completed Reservation Request Application form (CEC-1038 R1).			
The undersigned parties declare under penalty of perjury that the information provided in this form and any supporting documentation submitted herewith is true and correct to the best of their knowledge. The undersigned parties acknowledge that they are aware of the requirements and conditions of receiving funding under the ERP and agree to comply with all such requirements and conditions as provided in the Energy Commission's ERP Guidebook and Overall Program Guidebook as a condition of receiving funding under the ERP.			
<b>[PURCHASER SIGNATURE]</b>		<b>[EQUIPMENT SELLER SIGNATURE]</b>	
Signature: _____		Signature: _____	
Print Name: _____		Print Name: _____	





PAYEE DATA RECORD

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**PAYEE DATA RECORD**

STD. 204 (Rev. 6-2003) (REVERSE)

1	<p><b><u>Requirement to Complete Payee Data Record, STD. 204</u></b></p> <p>A completed Payee Data Record, STD. 204, is required for payments to all non-governmental entities and will be kept on file at each State agency. Since each State agency with which you do business must have a separate STD. 204 on file, it is possible for a payee to receive this form from various State agencies.</p> <p>Payees who do not wish to complete the STD. 204 may elect to not do business with the State. If the payee does not complete the STD. 204 and the required payee data is not otherwise provided, payment may be reduced for federal backup withholding and nonresident State income tax withholding. Amounts reported on Information Returns (1099) are in accordance with the Internal Revenue Code and the California Revenue and Taxation Code.</p>								
2	<p>Enter the payee's legal business name. Sole proprietorships must also include the owner's full name. An individual must list his/her full name. The mailing address should be the address at which the payee chooses to receive correspondence. Do not enter payment address or lock box information here.</p>								
3	<p>Check the box that corresponds to the payee business type. Check only one box. Corporations must check the box that identifies the type of corporation. The State of California requires that all parties entering into business transactions that may lead to payment(s) from the State provide their Taxpayer Identification Number (TIN). The TIN is required by the California Revenue and Taxation Code Section 18646 to facilitate tax compliance enforcement activities and the preparation of Form 1099 and other information returns as required by the Internal Revenue Code Section 6109(a).</p> <p>The TIN for individuals and sole proprietorships is the Social Security Number (SSN). Only partnerships, estates, trusts, and corporations will enter their Federal Employer Identification Number (FEIN).</p>								
4	<p><b><u>Are you a California resident or nonresident?</u></b></p> <p>A corporation will be defined as a "resident" if it has a permanent place of business in California or is qualified through the Secretary of State to do business in California.</p> <p>A partnership is considered a resident partnership if it has a permanent place of business in California. An estate is a resident if the decedent was a California resident at time of death. A trust is a resident if at least one trustee is a California resident.</p> <p>For individuals and sole proprietors, the term "resident" includes every individual who is in California for other than a temporary or transitory purpose and any individual domiciled in California who is absent for a temporary or transitory purpose. Generally, an individual who comes to California for a purpose that will extend over a long or indefinite period will be considered a resident. However, an individual who comes to perform a particular contract of short duration will be considered a nonresident.</p> <p>Payments to all nonresidents may be subject to withholding. Nonresident payees performing services in California or receiving rent, lease, or royalty payments from property (real or personal) located in California will have 7% of their total payments withheld for State income taxes. However, no withholding is required if total payments to the payee are \$1,500 or less for the calendar year.</p> <p>For information on Nonresident Withholding, contact the Franchise Tax Board at the numbers listed below:</p> <table border="0"> <tr> <td>Withholding Services and Compliance Section:</td> <td>1-888-792-4900</td> <td>E-mail address:</td> <td>wscs.gen@ftb.ca.gov</td> </tr> <tr> <td>For hearing impaired with TDD, call:</td> <td>1-800-822-6268</td> <td>Website:</td> <td>www.ftb.ca.gov</td> </tr> </table>	Withholding Services and Compliance Section:	1-888-792-4900	E-mail address:	wscs.gen@ftb.ca.gov	For hearing impaired with TDD, call:	1-800-822-6268	Website:	www.ftb.ca.gov
Withholding Services and Compliance Section:	1-888-792-4900	E-mail address:	wscs.gen@ftb.ca.gov						
For hearing impaired with TDD, call:	1-800-822-6268	Website:	www.ftb.ca.gov						
5	<p>Provide the name, title, signature, and telephone number of the individual completing this form. Provide the date the form was completed.</p>								
6	<p>This section must be completed by the State agency requesting the STD. 204.</p>								
	<p><b><u>Privacy Statement</u></b></p> <p>Section 7(b) of the Privacy Act of 1974 (Public Law 93-579) requires that any federal, State, or local governmental agency, which requests an individual to disclose their social security account number, shall inform that individual whether that disclosure is mandatory or voluntary, by which statutory or other authority such number is solicited, and what uses will be made of it.</p> <p>It is mandatory to furnish the information requested. Federal law requires that payment for which the requested information is not provided is subject to federal backup withholding and State law imposes noncompliance penalties of up to \$20,000.</p> <p>You have the right to access records containing your personal information, such as your SSN. To exercise that right, please contact the business services unit or the accounts payable unit of the State agency(ies) with which you transact that business.</p> <p>All questions should be referred to the requesting State agency listed on the bottom front of this form.</p>								



**R2****REBATE PAYMENT CLAIM FORM  
EMERGING RENEWABLES PROGRAM**
**RENEWABLE  
ENERGY  
PROGRAM**

CALIFORNIA ENERGY COMMISSION

Mail complete payment claim to:  
California Energy Commission  
ERP, Payment Claim  
1516 Ninth Street (MS-45)  
Sacramento, CA 95814-5512

Record Number \_\_\_\_\_

Payee Number \_\_\_\_\_

[CEC use only]

[CEC use only]

Total Eligible Cost: \$ \_\_\_\_\_ Date CFA: \_\_\_\_\_

SRO watts: \_\_\_\_\_ Rebate @ \_\_\_\_\_ = \$ \_\_\_\_\_

**1. Confirmation of Reservation Amount**

\_\_\_\_\_ has been granted a reservation of \$ \_\_\_\_\_ for a \_\_\_\_\_ kW renewable energy generating system. The reservation will expire on \_\_\_\_\_. The system is being installed at \_\_\_\_\_ and is expected to produce \_\_\_\_\_ (kWh per year). The payment will be made to the \_\_\_\_\_.

The generation system must be completed and the claim submitted with the appropriate documentation by the deadline. Claims must be postmarked by the expiration date or the reservation will expire. This reservation is non-transferable. System must be installed at the installation address and sold to the above.

**2. System Equipment ( Wind Turbines, Fuel Cell, Inverters, kWh Meters)**

Number	Manufacturer	Model

Total System Price \$ \_\_\_\_\_

Amount paid by purchaser to date: \$ \_\_\_\_\_

Is this the same equipment identified in the  
R1 Reservation Request Form? ☐ Yes ☐ No

**3. Modifications**

Has any of the information in section 1 or from the R1 or R1A form changed? ☐ Yes ☐ No

If yes note the changes before claiming payment.

The undersigned parties declare under penalty of perjury that the information provided in this form and the supporting documentation submitted herewith is true and correct to the best of their knowledge. The parties further declare under penalty of perjury that the following statements are true and correct to the best of their knowledge:

- (1) The electrical generating system described above and in any attached documents meets the terms and conditions of the Energy Commission's Emerging Renewables Program and has been installed and is operating satisfactorily as of the date stated below.
- (2) The electrical generating system described above and in any attached documents is either a) properly interconnected to the utility distribution grid and approved by the utility or will be issued utility approval to operate the system as interconnected to the distribution grid, or b) a fuel cell system for backup generation for emergency, safety, or telecommunication purposes that is serving electrical load that is not interconnected to the utility distribution grid.
- (3) The rated electrical output of the generating system, the physical location of the system, and the equipment identified were installed as stated above.
- (4) The electrical generating system described above and in the attached documents will only use renewable fuel if it is a fuel cell system.
- (5) Except as noted above, there are no changes in the information regarding the seller, installer, purchaser, generating system specifications, installation location, price, expected operation, or renewable fuel type, expected usage or supplier from that information provided in the Reservation Request Form originally submitted by the undersigned.

The undersigned parties further acknowledge that they are aware of the requirements and conditions of receiving funding under the Emerging Renewables Program (ERP) and agree to comply with all such requirements and conditions as provided in the Energy Commission's ERP Guidebook and Overall Program Guidebook as a condition to receiving funding under the ERP. As specified in the ERP Guidebook, the undersigned Purchaser authorizes the Energy Commission during the term of the ERP to exchange purchaser information on this form with the Purchaser's electric utility in order to verify compliance with the ERP requirements. If a copy of the utility "letter of authorization to operate" the system is not submitted with this payment claim form, the undersigned Purchaser understands that he/she is obligated to submit a copy of this letter to the Energy Commission once it is received.

**Purchaser**  
Print Name: \_\_\_\_\_  
Signature: \_\_\_\_\_  
Date: \_\_\_\_\_

**Seller**  
Print Name: \_\_\_\_\_  
Signature: \_\_\_\_\_  
Date: \_\_\_\_\_

**Is payment assigned to another party?** ☐ Yes ☐ No  
If yes, attach the payment assignment form (CEC-1038 R5) with original signatures.



## IMPORTANT - Necessary Supporting Documentation

1. Final building permit and final inspection signoff; 2. Final invoice(s) confirming the total amount paid for the system equipment and installation; 3. Five-year warranty (CEC-1038 R3 form); 4. Utility letter of authorization to interconnect the system 5. Utility bill or other proof of electrical service and consumption at the site of installation if not previously provided; 6. Renewable Fuel Supplier Attestation (CEC-1038 R2A), 7. Lease or Power Purchase Agreement, if applicable 8. Payee Data Record (STD-204)

## INSTRUCTIONS FOR THE REBATE PAYMENT CLAIM FORM (CEC-1038 R2)

The CEC-1038 R2 form is used to request payment for a completely installed and operational renewable energy system. The form specifies information about the renewable energy system that was to be installed at the time the reservation request was initiated. It also serves as a means of documenting what changes occurred from the time the reservation request was processed until the time the system was installed. The payment claim form must be submitted before the reservation expires.

### Section 1. Confirmation of Reservation Amount

Self explanatory.

### Section 2. System Equipment Installed

Fill in the equipment information requested including the number of units, the make, complete model number, and voltage (if applicable). Enter the total system price and the amount paid by purchaser to date. If the system is a wind system, identify the height and site wind class.

### Section 3. Modifications

Check the "yes" box if changes were made to the system and note any changes in the information from the previously submitted Reservation Request Form. If more space is required to note changes, additional pages may be added to the form. Changes in equipment from the original application may affect its eligibility and the amount of the rebate. If no changes were made, check the "no" box.

### Signatures:

The purchaser must always print and sign their name on the form. If the seller is the rebate payee, the seller must also print and sign their name on the form. Enter the date of each signature. Original signatures are required on the form.

Please indicate whether the rebate payment is to be assigned to a third party. A third party is an entity other than the purchaser or seller. If yes, please fill in the name and address in the space provided and attach the original of the assignment form (CEC-1038 R5). The assignment form must contain original signatures. Payees that assign the rebate payment to a third party will still be reported as the recipient of the payment(s) for tax purposes.

### Attachments:

Several attachments to the form must also be submitted before the claim will be processed. These include:

- A copy of the final building permit and final signoff
- A copy of the final invoices confirming the total amount paid for the system equipment and installation
- A copy of the completed and signed CEC-1038 R3 form (attach equipment warranty forms, if required)
- For grid-connected applications only, letter of authorization from the utility to interconnect the system.
- Copy of the utility bill or other proof of electrical service and consumption at the site of installation if not previously provided.
- For fuel cell systems, a completed and signed Renewable Fuel Supplier Attestation (CEC-1038 R2A)

### Building Permit and Final Signoff:

The name and address on the building permit must match the installation address on the payment claim form.

### Invoices:

The invoices must clearly identify the work that was done and the amount paid. This includes identifying the quantity, make and model numbers of major equipment installed and the labor charge for installation. To meet this requirement you may submit a copy of the final invoice(s) or a copy of the final contract(s) showing a zero balance or the amount paid by the purchaser. The invoice or contract should also indicate the extent to which the Commission's rebate lowered the cost of the system. Copies of bank statements, cancelled checks, or credit card statements may also be requested by Energy Commission staff. The final system price paid by the purchaser should match the price shown on any contract or invoice previously submitted. Any differences must be explained.

### Warranty:

Complete and attach the CEC-1038 R3 form. See instructions on form for details.

### Proof of Utility Interconnection:

For grid-connected systems only, utility letter of authorization to interconnect the system is required. The address in document must match the address of the installed system.

### Claiming a Rebate without a Prior Reservation

To claim a rebate without a previously approved reservation, you must also submit a completed and signed Reservation Request Form (CEC-1038 R1).

### Submit your request only by mail to:

ERP, Payment Claim  
California Energy Commission  
1516 9<sup>th</sup> Street, MS-45  
Sacramento, CA 95814-5512

Allow at least 6 to 8 weeks from receipt of a complete payment claim application for payment. Payment will be mailed to the retailer or purchaser as indicated on the Reservation Request Form at the address indicated on the Payee Data Record form (STD-204), unless you have assigned payment to a third party.



**R2A****RENEWABLE FUEL SUPPLIER  
ATTESTATION  
EMERGING RENEWABLES PROGRAM**

Please submit form to:

California Energy Commission  
Renewable Energy Program  
1516 Ninth Street, MS-45  
Sacramento, CA 95814-5512**I. Purchaser of Renewable Fuel Information**

Purchaser Name:

Purchaser Address:

Street:

City:

State:

Zip:

System Installation Site (street address where Purchaser's fuel cell system is installed), if different from above:

Street:

City:

State:

Zip:

Purchaser's Fuel Cell System. Type: \_\_\_\_\_ System Rated Output (Watts): \_\_\_\_\_

Backup Generation: ☐ Yes, ☐ No. Onsite Fuel Storage Capacity (ft<sup>3</sup>, gallon): \_\_\_\_\_ ERP Rebate No.: \_\_\_\_\_**II. Renewable Fuel Supplier Information**

Company Name of Renewable Fuel Supplier:

Company Address:

Street:

City:

State:

Zip:

Renewable Fuel Production Site (street address where renewable fuel is produced), if different from above:

Street:

City:

State:

Zip:

Name and Title of Company Representative Completing Sections II through IV of this Form:

**III. Renewable Fuel Information**

Type of Fuel (e.g. hydrogen from water):

Feedstock Used to Produce the Fuel (must be from a non-fossil fuel or non-fossil feedstock):

Process Used to Produce Fuel (e.g. Electrolysis):

Source of Electricity Used to Energize Process to Produce Fuel:

Is the source of electricity used to produce the fuel an "eligible renewable energy resource" as defined in Public Utilities Code Section 399.12, with reference to Public Resources Code Section 25741? ☐ Yes, ☐ No.If Yes, is the source of electricity a facility that has been Certified or Pre-Certified by the Energy Commission as eligible for the California Renewables Portfolio Standard (RPS)? ☐ Yes, ☐ No.

If Yes, provide the RPS Certification or Pre-Certification Identification No.: \_\_\_\_\_

Were the renewable attributes associated with the electricity used to produce the fuel disposed of separately in the form of renewable energy credits or other credits or offsets, or otherwise separated from the electricity and available for disposition, transfer or sale in the future? ☐ Yes, ☐ No.

(The electricity used to produce the fuel must remain bundled with the associated renewable attributes, so that renewable energy is used to produce the fuel. If the renewable attributes are unbundled from the electricity and disposed of separately, the fuel will not be produced with renewable energy and will not be considered a "renewable fuel" for purposes of fuel cell eligibility under the ERP.)

Energy Content of Fuel (mmBTU/ft<sup>3</sup>,gallon): \_\_\_\_\_

Quantity of Fuel Supplied to Purchaser (ft<sup>3</sup>,gallon): \_\_\_\_\_

Date Fuel Supplied to Purchaser: \_\_\_\_\_

#### **Section IV. Renewable Fuel Supplier Attestation**

I, the undersigned party, hereby declare under penalty of perjury that the information provided in Sections II through IV of this form is true and correct to the best of my knowledge. I further declare under penalty of perjury that the following is true and correct to the best of my knowledge:

- 1) I am an authorized representative of the company identified in Section II above and am authorized to make this attestation on the company's behalf;
- 2) I am aware of the requirements and conditions for receiving funding under the California Energy Commission's Emerging Renewables Program (ERP) as described in the California Energy Commission's ERP Guidebook and Overall Program Guidebook for the Renewable Energy Program;
- 3) I am aware that fuel cell systems are only eligible for ERP funding if they use a renewable fuel as defined in the ERP Guidebook; and
- 4) I am aware that the Purchaser identified in Section I above has secured funding from the ERP based on the fuel cell system described in Section I and based on the Purchaser's attestation that this fuel cell system will use the renewable fuel described in Section III above as supplied by the company identified in Section II above.

#### **Renewable Fuel Supplier**

Print Name and Title: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_



**R3****MINIMUM WARRANTY FORM  
EMERGING RENEWABLES PROGRAM****System Information**

This warranty applies to the following \_\_\_\_\_ kW renewable energy electric generating system

Description: \_\_\_\_\_

Located at: \_\_\_\_\_

**What is Covered**

This five year warranty is subject to the terms below (check one of the boxes):

- ☐ **All components of the generating system AND the system's installation.** Said warrantor shall bear the full cost of diagnosis, repair and replacement of any system or system component, at no cost to the customer. This warranty also covers the generating equipment against breakdown or degradation in electrical output of more than ten percent from the originally rated output (Manufacturers rating for wind turbines); or
- ☐ **System's installation only.** Said warrantor shall bear the full cost of diagnosis, repair and replacement of any system or system component, exclusive of the manufacturer's coverage. (Copies of five-year warranty certificates for the major system components (i.e., wind turbines, etc. and inverter- MUST be provided with this form.)

**General Terms**

This warranty extends to the original purchaser and to any subsequent purchasers or owners at the same location during the warranty period. For the purpose of this warranty, the terms "purchaser," "subsequent owner," and "purchase" include a lessee, assignee of a lease, and a lease transaction. This warranty is effective from \_\_\_\_\_ (date of completion of the system installation).

**Exclusions**

This warranty does not apply to:

- Damage, malfunction, or degradation of electrical output caused by failure to properly operate or maintain the system in accordance with the printed instructions provided with the system.
- Damage, malfunction, or degradation of electrical output caused by any repair or replacement using a part or service not provided or authorized in writing by the warrantor.
- Damage malfunction, or degradation of electrical output resulting from purchaser or third party abuse, accident, alteration, improper use, negligence or vandalism, or from earthquake, fire, flood, or other acts of God.

**Obtaining Warranty Service**

Contact the following warrantor for service or instructions:

Name: \_\_\_\_\_

Phone: (     )

Company: \_\_\_\_\_

Fax: (     )

Address: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_



**R5****RESERVATION PAYMENT ASSIGNMENT FORM  
EMERGING RENEWABLES PROGRAM**RENEWABLE  
ENERGY  
PROGRAM

CALIFORNIA ENERGY COMMISSION

Record Number \_\_\_\_\_

Payee ID Number \_\_\_\_\_

**Reservation Information**

Payee Name: \_\_\_\_\_

Payee Address: \_\_\_\_\_

Payee Contact: \_\_\_\_\_

Payee Phone #: \_\_\_\_\_

**Assignment Request**

I, \_\_\_\_\_, the designated payee or authorized representative of the payee, hereby assign the right to receive payment for the above noted reservation under the Emerging Renewables Program to the following individual or entity:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Phone #: \_\_\_\_\_

I request that payment be forwarded to this individual or entity at the address noted. Upon request proof of payment will be forwarded to me.

**Acknowledgement**

As the designated payee or authorized representative, I understand that I remain responsible for complying with the requirements of the Emerging Renewables Program and will remain liable for any tax consequences associated with the reservation payment, despite the payment's assignment. I further understand that I may revoke this payment assignment at any time prior to the Energy Commission's processing of the payment by providing written notice to the Energy Commission's Renewable Energy Office. Such notice shall be provided to: Emerging Renewables Program, California Energy Commission, 1516 9<sup>th</sup> Street, MS-45, Sacramento, CA 95814-5512.

Executed on: \_\_\_\_\_

Signature: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

This completed form may be submitted with either the Reservation Request Form (CEC-1038 R1) or the Payment Claim Form (CEC-1038 R2) for standard rebates. This form may not be submitted by telefax, as original signatures are needed to process assignment requests.





## **Appendix 2 Tips for Consumers**

This Appendix provides some basic guidelines for those who are not familiar with renewable energy systems and may be interested in learning more. The Energy Commission has a variety of sources of additional information about choosing a renewable energy system, finding retailers, or estimating a system's energy output. This information can be obtained by visiting the Energy Commission's website at [[www.consumerenergycenter.org/](http://www.consumerenergycenter.org/)].

### **A. Choosing a Contractor**

Make sure the contractor is licensed by the Contractors State License Board. State law specifies that any job that costs \$500 or more (labor and materials) requires the services of a licensed contractor. As with any large purchase decision, the Energy Commission recommends that a customer obtain at least two or three bids before selecting an installer or agreeing to purchase a renewable energy system. The final contractor selection should be based on various factors including company reputation, warranty service, and installed system price. The Contractors State License Board [[www.cslb.ca.gov](http://www.cslb.ca.gov)] provides helpful consumer information, has a process to address complaints against contractors, and maintains information about the status of contractor licenses. The Energy Commission recommends that the status of the installer's contractor license be verified for consumer protection.

### **B. Choosing a Retailer**

The Energy Commission maintains a list of renewable energy system retailers to make it easier to find products in your area. The list is available on the Energy Commission's webpage at [[www.gosolarcalifornia.ca.gov/retailers/search-new.php](http://www.gosolarcalifornia.ca.gov/retailers/search-new.php)].

### **C. How Much Energy Does a System Produce?**

The annual amount of energy from an eligible renewable energy system can be estimated and in most cases can be guaranteed by the system retailer or installer. The annual amount of wind energy at a given location can be estimated, but is somewhat difficult to predict accurately without sufficient site wind speed data. It is important to note that wind turbines are rated at a wind speed of 28 miles per hour and some wind turbines do not produce any energy until the wind speed exceeds 12 miles per hour.

Battery backup systems are an option when purchasing renewable energy system and have the advantage of providing power during a utility outage. However, adding battery back-up significantly increases the cost of the generating system, requires additional maintenance, and reduces the useful energy output of the system by about 10 to 20 percent compared to a similar system without batteries.

Be sure to compare the energy output that contractors prepare before choosing a contractor. The energy output from a system is a much better indicator of the system performance than is the systems rated output. Also, be sure to verify that your installed system has an easy to read meter installed that measures the energy produced in kilowatt hours. A meter is required by the ERP so that you will be able to determine if your system is operating properly. The utility meter only provides the net energy used at your home but does not tell you how much energy your system produces.

You may wish to consider purchasing a pre-designed packaged system to reduce the chance of safety or performance problems with mismatched equipment. Of course, all systems are not the same and may not suit your particular situation. Also, be sure that your system warranty clearly identifies the responsible party for repairing your system in the event of a malfunction or break down. Although you may be able to obtain lower prices by purchasing system components and equipment separately, keep in mind that the money you save may be more than offset by increased installation costs and lower energy output because of mismatched equipment. This, in turn, could affect your warranty coverage.

System prices vary depending on the technology, equipment type, local labor rates, site conditions, and other factors. The following table lists a range of system prices and annual energy production that are typical for wind energy system installations.

**Table 3: Typical Wind Energy System  
Prices and Energy Production**

Technology Type	Typical Energy Production (kWh/year)	Typical Installed System Prices <sup>1</sup>
Wind Energy Systems <sup>2</sup>		
3 kW	4,990 to 8,500	\$12,000-18,000
10 kW	8,400 to 16,440	\$30,000-50,000

1. Price examples are for 2002. The incentives will decrease to promote similar reduction in price.
2. Wind calculations based on manufacturer's predicted monthly energy production for a site with average wind speeds of 11 mph and 14 mph.



## Appendix 3 Criteria for Listing Components as Eligible

This Appendix summarizes the criteria used for listing which components can be used to create a renewable energy system that is eligible for a rebate from the Emerging Renewables Program.

The equipment must meet national or internationally recognized electrical standards or other appropriate criteria. Until the equipment is listed, it is not eligible and no funding will be reserved or paid. Equipment that has not met the aforementioned requirements will not be placed on the lists.

If a component becomes decertified according to the testing requirements described below, and is removed from the Energy Commission's lists of eligible components before a reservation is granted, applicants may be required to modify their systems by replacing the decertified component with a certified component before a payment is issued.

Generating equipment (e.g. wind turbines), inverters, and performance meters are periodically added and removed from the lists of eligible equipment.

### A. Small Wind

There are two options to achieve ERP eligibility for small wind systems:

1. Small wind turbines must be certified as meeting the requirements of a small wind turbine-specific safety and/or performance standard adopted by a national or international standards setting body, including, but not limited to International Electrical Code (IEC) 61400-2. The Energy Commission will monitor, review, and may participate in the Interstate Renewable Energy Council's efforts to create a national certification program.

OR

2. Manufacturers of small wind systems must provide monthly data of average energy produced (kWh) and average wind speed for one consecutive year for each model of system they wish to be considered eligible for this program to demonstrate reliable operation of that model of equipment at a site with average annual wind speeds of at least 12 mph.

### B. Fuel Cells

All fuel cells must be certified as meeting the requirements of ANSI/CSA America FC 1-2004 for fuel cell power plants.

## C. Inverters

All inverters must be certified as meeting the requirements of UL 1741 **for inverters that will be used exclusively with small wind turbines or fuel cells.** Only inverters that have completed the testing will be listed as eligible equipment.

**Additional testing is required by a qualified Nationally Recognized Test Laboratory for inverters that will be used with solar photovoltaic systems participating in the California Solar Initiative or the New Solar Homes Partnership.<sup>16</sup>**

The Energy Commission also plans to consider if changes should include adjusting the ratings for inverters with battery-backup to account for losses inherent in battery back-up systems or for wind specific applications.

## D. Metering Criteria

Meters must retain the kilowatt-hour production data in the event of a power outage and must be easy to read for the customer's benefit. The meter must measure the total energy produced by the system in kilowatt-hours (or watt hours) and have a manufacturer's uncertainty specification of plus or minus five percent.

## E. Other Technologies

New technologies may be added by petitioning the Energy Commission, through the appropriate Committee. Applicants must submit the proper documentation satisfying all of the following criteria:

- 1) Financial assistance is required for these technologies to become commercially viable.
- 2) The technology must be commercially available with at least one vendor available for the sale of the system.
- 3) Vendors of any generating systems employing the technology must offer at least a five-year full warranty on the entire generating system.
- 4) The technology must show at least one year of demonstrated reliable, predictable, and safe performance by a full-scale facility using this technology under field conditions.
- 5) The available data must show that generating systems using the technology have a useful design life of at least 20 years.

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<sup>16</sup> Nationally Recognized Testing Laboratories shall be those laboratories that have been recognized by the U.S. Department of Labor, Occupational Safety & Health Administration (OSHA), in accordance with Title 29 of the Code of Federal Regulations, section 1910.7, and are approved to conduct test UL 1741 under the scope of their OSHA recognition. A list of all current Nationally Recognized Testing Laboratories is available on OSHA's web page at [[www.osha.gov/dts/otpc/nrtl/index.html](http://www.osha.gov/dts/otpc/nrtl/index.html)]. Please note, not all of the Nationally Recognized Testing Laboratories identified on OSHA's list are approved to conduct test UL 1741.

- 6) The technology must be designed so that it can produce grid-connected electricity, unless the system purpose is for backup generation used for emergency, safety, or telecommunications.
- 7) The technology represents a new electricity generating process not well represented among existing grid-connected renewable generating facilities, rather than some evolutionary or incremental improvements to renewable technologies used in existing renewable resource technology generating facilities (examples of such evolutionary or incremental improvements will be: a) an improved blade design for wind turbines, b) less expensive well drilling techniques for geothermal, or c) a more efficient burner design for a biomass plant).
- 8) The project must be designed exclusively for the purpose of producing electricity for on-site use or sale (excluding demonstration projects that may sell to one specific customer), in contrast to a research or demonstration facility, which is designed primarily for collecting additional research data.





## Appendix 4 Maximum System Size Calculations

This Appendix describes the method used to determine the maximum system size eligible for incentives from the program. Because the average annual residential electricity consumption in California is about 7000 kWh/yr system, 5 kW and under are exempt from the maximum size limitation.

In cases where the proposed system size is greater than 5 kW, the system must be sized that the expected production of the system is no greater than 100 percent of the building's on-site estimated annual electricity consumption. The customer may submit either a recent utility bill, the estimated annual electricity consumption of the building based on a detailed energy use calculation signed by a professional energy rater or a letter from a qualified architect, engineer, or electrical contractor (C-10 licensed) detailing expected energy consumption. In cases where the expected electricity production is greater than 100 percent of the estimated annual consumption, the rebate reserved will be reduced by an amount equal to the ratio between the estimated annual consumption and the expected system production.

If the Energy Commission calculates a reduced rebate amount, the applicant may submit subsequent utility bills within the following three months to receive their full reservation amount, provided there are sufficient program funds available at that time to make an additional payment.



## **Appendix 5 Atypical Incentive Applications**

### **A. New Construction (Building Permit)**

For sites that currently do not have electrical service, a copy of the building permit for the new home or major site improvement must be included with the reservation application (not remodeling projects). All approved applications for new construction will receive 18 month reservations.

### **B. Systems Installed by Sellers or Contractors for Their Own Personal or Business Use**

Renewable energy system sellers (e.g., retailers, wholesalers, manufacturers) or contractors who arrange to have a system installed by a separate company on their own home or place of business may qualify for the full rebate. To receive a reservation, the applicant must submit documentation consistent with that of an individual independently buying a system. When an equipment seller purchases equipment for the seller's own use, the purchase agreement (or proof of purchase) must be between the purchaser and the generating equipment supplier, in most cases the wholesaler.

The supplier must be identified as the seller on the application form and must be registered with the Energy Commission. If the labor installation is done by a contractor on his own home or place of business, the application will be treated as an owner installed system unless the contractor hires an independent company to do the system installation and is able to document payments to the independent company. The purchase and installation agreements must be between two independent entities. Documentation of a purchase between two principals or owners within the same entity or between spouses is not acceptable, nor is a purchase agreement if signed by the same individual.

### **C. Adding to Existing Systems**

Additions to existing systems will only be allowed for systems that met past program requirements and were partially funded by participating in the Energy Commission's program. For these projects, the Energy Commission has the records and documentation identifying the equipment that was installed previously, the program warranty, and system equipment standards and warranties that were met by the originally installed equipment. The newly added generating equipment must be selected from the current lists of eligible equipment and meet the current guidebook requirements. All of the current program eligibility criteria and documentation requirements apply to the added equipment.



The rebate calculation will be based on the incremental rated capacity of the added equipment. Under no circumstances will the rebate for the added equipment exceed the current rebate for the incremental watts added.

Because the rebate for wind decreases with the system size, the incremental calculation will be based on the incremental system size above the pre-existing system.

#### Sample Calculation - Incremental Calculation for Wind Systems

Existing 5,000 watt system, rebate amount is:  $\$3.00 \times 5,000 = \$15,000$

Adding 6,000 watts for a total of 11,000 watts (no inverter capacity limitation)

Current rebate level is \$3.00 per watt for first 10 kW and \$1.50 per watt for increments above 10 kW

The rebate available for the new addition is:

$5,000 \text{ W} \times \$3.00/\text{watt} + 1,000 \times \$1.50/\text{watt}$  (for contractor installation) = \$16,500

## D. Special Requirements for Leased Systems

Wind energy systems or fuel cells that are leased by an end-use customer or provide electricity to an end-use customer under a power purchase agreement (PPA) are eligible for ERP funding if the lease agreement or PPA is executed and has a start date on or after July 1, 2009. Lease agreements and PPAs that are executed or have a start date prior to July 1, 2009, are not eligible for funding even though the system may have been installed after this date. Lease agreements and PPAs must have an initial term of no less than 10 years and must provide the lessee or customer the option to renew the agreement, purchase the system, or remove the system at the end of the initial term of the agreement. In addition, lease agreements and PPAs must demonstrate that the ERP funding benefits the end-use customer by directly and exclusively reducing the lease payments for the system or the cost of electricity produced by the system.

For the first five years of the lease or PPA, the lessor or owner of the solar energy system, in the case of a PPA, shall provide an annual status report to the Energy Commission on the operation of the ERP-funded energy system. The annual status report shall address agreements executed through December 31 of each year, be submitted to the Energy Commission no later than January 31 of each year, and shall include the following information for each system:

- 1) Date that the agreement was fully executed and the start date of the agreement;
- 2) Operational status of the system; and
- 3) Status of the agreement, and if status has changed, date of change and reason for the change. (Status changes would primarily include, change in lessee or customer, system purchase, termination of agreement, and system removal.)

If any lease agreement or PPA for a system that received funding from the ERP is terminated and the system is removed from the building on which it was originally installed, the ERP

funding received by the applicant shall be repaid by the Lessor or system owner to the Energy Commission in the amounts specified below:

- If the agreement is terminated within one year of the system's installation or the start date of the agreement, whichever is later, 100 percent of the funding received shall be repaid;
- If the agreement is terminated within two years of the system's installation or the start date of the agreement, whichever is later, 80 percent of the funding received shall be repaid;
- If the agreement is terminated within three years of the system's installation or the start date of the agreement, whichever is later, 60 percent of the funding received shall be repaid;
- If the agreement is terminated within four years of the system's installation or the start date of the agreement, whichever is later, 40 percent of the funding received shall be repaid;
- If the agreement is terminated within five years of the system's installation or the start date of the agreement, whichever is later, 20 percent of the funding received shall be repaid;
- Repayment shall not be required if the agreement is terminated more than five years after the system's installation or the start date of the agreement, whichever is later.

Repayment will not be required if a system is destroyed by natural disaster or fire at no fault of the lessor/owner or lessee/customer.

Nothing in this section precludes an applicant from using an otherwise valid reservation to request a rebate for a system that is leased or provides electricity through a power purchase agreement.

## **E. Time Extension Requests**

Time extensions to a reservation are not available under any circumstances. Applicants failing to install their systems and submit a complete reservation payment claim within the reservation period must reapply for funding at the rebate level and under the terms and conditions applicable at the time of reapplication.





## **Michael A. Klemen**

8810 56<sup>th</sup> Ave N  
Harwood, ND 58042  
(701) 282-6550 (home)  
(701) 261-5810 (cell)

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### **Objective**

I would like to be in a position with technical leadership responsibilities where I can use the full capabilities of my analytical skills.

### **Work Experience**

#### **North Dakota State University**

**02/1999-present**

##### **Assistant Director HRM/Financial Systems development 05-2009-present**

- Project planning for Peoplesoft HRMS and Financial upgrades/patches
- Providing direction for development staff
- Improving communication among team members
- Providing development assistance for any team members

##### **Patch Coordinator/Programmer Analyst**

**06/2007-05/2009**

- Project planning for patching the PeopleSoft environments
- Technical lead - assisting other development staff, and work as a team member on both the HRMS and Finance development teams

##### **Programmer/Analyst II**

**12/1999-06/2007**

- Work as a team member in the analysis, design, coding, testing and documentation of major automated information systems
- Named Data Warehouse Team Leader in October 2000 to support the custom Data Warehouse (Executive Decision System)
- Wrote the Online Student Admissions Application in PeopleSoft as the University System converted to PeopleSoft (2002)
- Supported both the Finance and HRMS conversions to PeopleSoft (2003 & 2004)
- Lead developer in troubleshooting payroll problems in PeopleSoft (2005-present)
- Lead developer in patching PeopleSoft Financials and HRMS (2005-present)
- Lead developer in HRMS 8.3 to 8.9 upgrade (2006)

##### **Programmer/Analyst I**

**02/1999-11/1999**

#### **Self Employed**

**01/1995-01/1999**

- Wrote Windows 95/Windows 3.11 programs for commodity traders

- Wrote Windows 95 data acquisition program for analyzing renewable energy systems
- Analyzed renewable energy systems data
- Traded commodities

**Bucknell University**

**09/1994-01/1995**

**Systems Integrator (temporary position)**

**12/1994-01/1995**

- Responsible for Unix system administration tasks for major campus computers
- Successfully determined why performance was poor on one machine that caused campus email to grind to a halt.

**Client Services Analyst (temporary position)**

**09/1994-12/1994**

**Education**

Bucknell University (ABME)

1993

Joint degree - B.S. Mechanical Engineering, B.A. Computer Science

Coursework for Masters in Mechanical Engineering completed, including "Flow Induced Noise and Vibration" and "Acoustics"

State of North Dakota Basic Certification in Project Management April 16, 2002

PeopleSoft Training (Since 2002)

- PeopleTools 1 & 2
- PeopleCode
- Application Engine
- Workflow

**Renewable Energy**

1996 through Present – acquire and analyze renewable energy systems data using custom-written data acquisition and analysis programs

1997 – Home Power Magazine Article "*Wind Speed Data and its Application to Wind Generated Power*"

1998 through present - member of AWEA-Wind-Home (now Small-Wind-Home) Wind Energy discussion list on Yahoo! Groups

2000 through present (approx) – maintain a small wind energy web site, and FAQ for AWEA-Wind-Home ( <http://www.ndsu.edu/ndsu/klemen> )

2002 - Presentation "*RE: What Really Matters (What I've Learned)*" at Midwest Renewable Energy Association's Annual Energy Fair

2003 – Board of Directors ND SEED (North Dakota Sustainable Energy for Economic Development)

2004 – Global WINDPOWER 2004 - Presentation "*Experiences in Testing Numerous Small Wind Turbines and Comments on Turbine Design*"

2005 – Small Wind Turbine Certification – was a member of the group that developed the pending AWEA Standard for Small Turbines

2008 – Presentation “*Small Wind Testing Workshop*” to be given at NREL  
(National Renewable Energy Labs) September 12, 2008

2009 to present - Certification Commissioner for the Small Wind Certification  
Council

**Attachment B**

**California Energy Commission Agreement  
Number 400-07-030 with KEMA Inc.**



CALIFORNIA ENERGY COMMISSION

1516 NINTH STREET  
SACRAMENTO, CA 95814-5512



July 16, 2008

Nellie Tong  
Kema, Inc.  
492 Ninth Street, Suite 220  
Oakland, CA 94607

Re: Agreement Number: 400-07-030  
Technical Assistance for the Renewable Energy Program

Dear Ms. Tong:

Enclosed is the fully executed copy of the above-referenced Agreement for your records. You are now authorized to provide the agreed upon services.

If you have any questions or need clarification on items requested, please contact me at (916) 654-5833 or [ltomita@energy.state.ca.us](mailto:ltomita@energy.state.ca.us).

Sincerely,

A handwritten signature in black ink, appearing to read "Lori Tomita", written in a cursive style.

LORI TOMITA  
Contracts Officer

Enclosures

cc: File  
Rachel Salazar  
Accounting

# STANDARD AGREEMENT

STD. 213 (NEW 06/03)

AGREEMENT NUMBER

400-07-030

REGISTRATION NUMBER

33600708322450

1. This Agreement is entered into between the State Agency and the Contractor named below

STATE AGENCY'S NAME

State Energy Resources Conservation and Development Commission (Energy Commission)

CONTRACTOR'S NAME

Kema, Inc.

June 9, 2008

2. The term of this Agreement is:

May 1, 2008 to April 30, 2011. The effective date of this Agreement is either the start date or the approval date by the Dept. of General Services, whichever is later. No work shall commence until the effective date.

3. The maximum amount of this Agreement is:

\$3,681,000.00

4. The parties agree to comply with the terms and conditions of the following exhibits which are by this reference made a part of the Agreement:

Exhibit A – Scope of Work

19 Pages

Exhibit B – Budget Detail and Payment Provision

5 Pages

Exhibit B – Attachment B-1

8 Pages

Exhibit C\* – General Terms and Conditions

GTC 307

Exhibit D – Special Terms and Conditions

10 Pages

Exhibit E – Additional Provisions

7 Pages

Exhibit F – Contacts

1 Page

Items shown with an Asterisk (\*), are hereby incorporated by reference and made part of this agreement as if attached hereto. These documents can be viewed at [www.ols.dgs.ca.gov/Standard+Language](http://www.ols.dgs.ca.gov/Standard+Language)

IN WITNESS WHEREOF, this Agreement has been executed by the parties hereto.

## CONTRACTOR

CONTRACTOR'S NAME (If other than an individual, state whether a corporation, partnership, etc.)

Kema, Inc.

BY (Authorized Signature)

*Karin Corfee*

DATE SIGNED (Do not type)

4/30/08

PRINTED NAME AND TITLE OF PERSON SIGNING

Karin Corfee

ADDRESS

492 Ninth Street, Suite 220  
Oakland, CA 94607

## STATE OF CALIFORNIA

AGENCY NAME

State Energy Resources Conservation and Development Commission (Energy Commission)

BY (Authorized Signature)

*Cheryl Raedel*

DATE SIGNED (Do not type)

5-21-08

PRINTED NAME AND TITLE OF PERSON SIGNING

Cheryl Raedel, Contracts Office Manager

ADDRESS

1516 Ninth Street, Sacramento, CA 95814

California Department of General Services Use Only

APPROVED

JUL 11 2008

DEPT OF GENERAL SERVICES

☐ Exempt per:

*[Signature]*

## EXHIBIT A SCOPE OF WORK

### **PURPOSE**

The purpose of this contract is to provide technical assistance to the California Energy Commission (Energy Commission) to support its Renewable Energy Program (REP) and responsibilities related to the California Renewables Portfolio Standard (RPS).

### **Primary Tasks**

The amount of consultant assistance required for each project will vary depending on the availability of Energy Commission staff with expertise in specific areas and the sensitivity of issues associated with each project. Final assignment of tasks and maximum payment on individual projects will be described in work authorizations issued by the Energy Commission Contract Manager.

Through the work authorization process, the Contractor may be assigned work on a variety of tasks related to the REP or its program elements, including contract management; assistance with the Existing Renewable Facilities Program; assistance with the RPS; assistance with the New Renewable Facilities Program; assistance with the Renewable Rebate Programs or related activities (including the Emerging Renewables Program, New Solar Home Partnership, and Senate Bill 1<sup>1</sup> activities); assistance with the Consumer Education Program; and assistance with Evaluation as defined in the primary contract tasks below.

The major categories of work are divided into the following tasks:

<b>Tasks</b>	<b>Description of Task</b>
1	Contract Management and Reporting Requirements
2	Existing Renewable Facilities Program (ERFP)
3	Renewables Portfolio Standard (RPS)
4	New Renewable Facilities Program (NRFP)
5	Renewable Rebate Programs
6	Consumer Education Program
7	Evaluation

### **Task 1 – Contract Management and Reporting Requirements**

The Contractor shall perform various administrative operations and management-related tasks at the direction of the Energy Commission Contract Manager including but not limited to:

- A. Develop, refine and execute Energy Commission-approved work authorizations on an “as-needed” basis, in conjunction with REP staff, and appropriate assistance from subcontractors. Each work authorization shall define the scope

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<sup>1</sup> Senate Bill 1 (stats. 2006, ch. 132)

of work, the schedule of deliverables and the estimated project budget for authorized tasks to be performed by the Contractor and its authorized subcontracting team members.

- B. Prepare and issue contract agreements with subcontractors that convey all provisions contained in the contract between the Energy Commission and the Contractor.
- C. Coordinate the availability of subcontractors to meet the needs of Energy Commission staff as authorized by the Energy Commission Contract Manager.
- D. Hire vendors or additional subcontractors to obtain needed products and services pursuant to the Special Terms and Conditions, EXHIBIT D, Section 2, of Attachment 5 (sample Standard Agreement).
- E. Audit subcontractor invoices to ensure that they correctly identify and explicitly correlate with the required information pursuant to EXHIBIT B, Section 1.D., of Attachment 5 (sample Standard Agreement).
- F. Prepare and submit monthly invoices to the Energy Commission for contract management and technical support services and for payment of subcontractor invoices pursuant to EXHIBIT B, Section 1.A., of Attachment 5 (sample Standard Agreement).
- G. Pay subcontractors in a timely manner for satisfactory products no later than upon receiving the payment from the Energy Commission.
- H. Prepare and submit retention invoices for all completed and approved work authorizations for which final deliverables have been approved by the Energy Commission Contract Manager, but excluding all Contractor administrative task authorizations (Task 1).
- I. Maintain a current contract management database capable of tracking:
  - Contractor and subcontractor work authorization, and invoice activity and the implementation status of all approved work authorizations.
  - Contract and individual work authorization budgets.
- J. Provide verbal or written briefings regarding contract activities or budget to the Energy Commission or other entities, as authorized by the Energy Commission Contract Manager.
- K. Respond to information requests or direction from the Energy Commission Contract Manager.
- L. Provide administrative and/or technical support for the REP, as authorized by the Energy Commission Contract Manager through approved work authorizations.
- M. Provide other REP project management tasks as authorized by the Energy Commission Contract Manager.

- N. Attend program support and project-related development meetings and hold telephone discussions regarding project management issues, as requested by the Energy Commission Contract Manager.

### **Monthly Progress Reports**

The Contractor, with assistance from appropriate subcontractors, shall provide monthly progress reports on the previous month's activities to the Energy Commission Contract Manager describing:

- Monthly progress in each work authorization and task.
- The degree of completion of each work authorization and task.
- Status of upcoming deliverables including any expected delays.
- Cumulative budget expenditures by work authorization and task.
- Cumulative budget expenditures of total contract.
- Proposed or Energy Commission Contract Manager-approved changes in task description, deliverable due date(s), and budget.
- Other information requested by the Energy Commission Contract Manager.

All monthly reports are to be submitted both electronically, and in duplicate, hard copy form to accompany and coincide with the official invoice being submitted to the Energy Commission. The Energy Commission Contract Manager will specify the report format.

### **Final Report**

A Final Report shall be prepared which includes a description of the overall project, the work accomplished during the contract, the effectiveness of the contract in meeting the objectives of the program, and future activities recommended to increase the effectiveness of the program and this contract.

A draft Final Report is due 45 days prior to the end of the contract. The Final Report is due no later than 30 days prior to the end of the contract. The report shall be prepared in language easily understood by the public or laypersons with a limited technical background. A draft of the Final Report must be reviewed and approved by the Energy Commission Contract Manager prior to becoming final. The Final Report shall include an analysis of:

- The work accomplished during the contract.
- The effectiveness of this contract in meeting the objectives of the program.
- Recommended future activities that will increase the effectiveness of the program and this contract.

The Contractor shall meet with the Energy Commission to present the findings, conclusions, and recommendations. The Final Report must be delivered to the Energy Commission Contract Manager 30 days before the termination date indicated in the term of the contract.



The outline of the Final Report shall be prepared as indicated in the terms and conditions of the contract and the following:

- Title Page
- Executive Summary: Describe the contract goals, how the contract work was implemented, size, schedule, source of project funds, number of projects funded, and provide an overview of results from the contract listed by program (task) area.
- Table of Contents: Organize the report by program area (task number) and by work authorization number (beginning with the earliest number).
- Contract Results: Each work authorization shall be summarized. Each summary shall include the specific request, results of the work performed, and the conclusions and/or recommendations developed by the work. Each subcontractor shall be responsible for writing its own summaries and forwarding them to the Contractor and the Contractor shall be responsible for editing and combining these summaries into the reports.

#### Deliverables and Due Dates

All work assignments will be made through specific work authorizations and will specify the schedule of deliverables.

#### **Task 2 – Existing Renewable Facilities Program (ERFP)**

The statutory purpose of the Existing Renewable Facilities Program (ERFP) is to achieve fully competitive and self-sustaining existing in-state solid-fuel biomass, solar thermal electric, and wind facilities, and to secure for the state the environmental, economic, and reliability benefits that continued operation of these facilities will provide. California Public Resources Code section 25740.5 requires that the Energy Commission “optimize public investment and ensure that the most cost-effective and efficient investments in renewable energy resources are vigorously pursued.”

The ERFP provides funding in the form of production incentives to eligible renewable energy facilities for each kilowatt-hour (kWh) of eligible electricity generated. Funds from the ERFP are reserved for renewable generators who were on-line and generating electricity for sale before September 26, 1996. Facilities eligible for funding are issued a Funding Award Notice by the Energy Commission to provide funding pursuant to the Energy Commission's *Existing Renewable Facilities Program Guidebook*, *Renewables Portfolio Standard Eligibility Guidebook*, and *Overall Program Guidebook*. The Funding Award Notice does not specify dollar amounts to be paid to the facility; rather the Notice identifies the following information:

- Pertinent information about the applicant, the facility, and the facility's power purchase agreement.
- The facility-specific target price and production incentive cap for that calendar year.
- The terms and conditions under which the ERFP funding will be provided, including any funding restrictions and prevailing wage requirements.

If approved by the Energy Commission, the Funding Award Notice must be signed by an authorized representative of the facility and an authorized representative of the Energy Commission in order to become effective. The Energy Commission will issue production incentive payments on a monthly basis in accordance with the facility-specific target price and production incentive cap and appropriate market prices, and conditional upon the recipient's: monthly invoices and submittal of written third-party verification to the Energy Commission to verify the facility's eligible generation.

Funding Award Notices are limited term awards to provide funding for one calendar year. By January 31, eligible generators must apply for funding for the current calendar year if seeking production incentive payments for that year. The Energy Commission staff annually evaluates funding applications to recommend appropriate funding awards per project. The staff, under direction of the Energy Commission's Renewables Committee, drafts Funding Award Notices that are considered for adoption by the Energy Commission.

Under this task, the Contractor will:

- A. Evaluate the incentives being paid to biomass, solar thermal, and wind facilities to ensure the incentives are sufficient to maintain the operation of these renewable facilities and encourage their self-sufficiency while not providing them an unjustified bonus that has no bearing on their generating pattern.
  - 1. Continually monitor and evaluate the target price of incentives to ensure appropriateness and make recommendations on changes when needed.
  - 2. Continually monitor and evaluate the cap values for incentives to ensure appropriateness and make recommendations on changes when needed.
  - 3. Continually monitor and evaluate the market price(s) and/or indices used to determine incentives to ensure that their use is appropriate and that facilities are neither over nor under paid, and make recommendations on appropriate market price(s) when necessary.
  - 4. Continually monitor and evaluate fuel, operations, and maintenance costs for facilities and technologies eligible for ERFP funding.
  - 5. Continually monitor and evaluate economic factors that affect the continued operation, competitiveness, and self-sustainability of facilities eligible for ERFP.
- B. Evaluate the impact these incentives have on the generating pattern of the various technologies and how the determination of what market price is used may impact their generating pattern (positive or negative).
- C. Evaluate the approach and process for determining and making incentive payments.
- D. Monitor and evaluate the financial assistance ERFP participants receive from other government agencies via contracts, grants, or other programs of assistance.

- E. Evaluate alternative funding mechanisms for providing funding for the use of biomass fuels and determine if alternatives would be more effective in meeting program goals than the current method used.
- F. Evaluate how (or if) changes in the definition of a “new” facility and the September 26, 1996, eligibility date for the ERFP will impact the program.
- G. Conduct audits, as necessary, of facilities receiving ERFP funding to ensure the facilities continue to meet ERFP eligibility requirements.
- H. Review, verify, and analyze financial statements, balance sheets, and other economic records retained by facilities that identify operating costs, federal and state tax credits, facility contracts for energy and capacity pricing, and other attributes.
- I. Assist Energy Commission staff in collection and management of ERFP data.
- J. Evaluate and propose refinements or changes as necessary to the ERFP to reflect changes in the law or changes in market conditions or policy direction.
- K. Provide other needed technical support that arises for the ERFP.

#### *Deliverables and Due Dates*

All work assignments will be made through specific work authorizations and will specify the schedule of deliverables.

#### **Task 3 – Renewables Portfolio Standards (RPS)**

The objective of the RPS Program is to foster achievement of the state’s 20 percent RPS targets by 2010, and to establish policies to meet that goal in the most efficient, equitable, and cost-effective manner possible. This includes developing, implementing, and updating guidelines at the Energy Commission and providing technical and policy support to the CPUC in their rulemaking process. As part of the implementation efforts, the program will address RPS implementation for IOUs, Electric Service Providers, Small and Multi-Jurisdictional Utilities, and Community Choice Aggregators. Further, the program may support implementation by publicly owned utilities. The program also includes efforts to track, evaluate, and report on program results.

Along with developing the RPS implementation guidelines, the Energy Commission has designed a renewable energy tracking and verification system known as the Western Renewable Energy Generation Information System (WREGIS) to address long-term RPS tracking needs. The Western Electricity Coordinating Council will act as the institutional home of WREGIS and will provide the necessary staff to develop and administer the program. WREGIS became operational in June 2007. WREGIS is discussed further later in the section.

Although the work required to implement the RPS is distinct from that required to implement the greenhouse gas emission reduction goals set in AB 32<sup>2</sup> has effectively ratcheted up the importance of achieving the state's RPS targets. Additional new RPS eligible generation is now recognized as a key strategy to achieving California's greenhouse gas emission reduction objectives as AB 32 commits the state to reducing greenhouse gas emissions to 2000 levels by 2010 and to 1990 levels by 2020. For the post 2020 timeframe, the Governor has established a greenhouse gas emission reduction goal of 80 percent below 1990 levels by 2050.<sup>3</sup>

Under this task, the Contractor will:

- A. Assist Energy Commission staff in developing implementation rules and guidelines for retail sellers, including electric service providers, small and multi-jurisdictional utilities, and community choice aggregators, and if applicable, local publicly-owned electric utilities.
- B. Assist Energy Commission staff in providing support to publicly owned utilities in their efforts to implement the RPS.
- C. Assist Energy Commission staff in evaluating the applications to certify RPS-eligible renewable resources, including but not limited to applications to certify re-powered, mixed fuel use, out-of-state, and hydroelectric facilities.
- D. Assist Energy Commission staff in evaluating the progress and effectiveness of the RPS Program statewide.
- E. Assist Energy Commission staff in evaluating and developing implementation rules for the use of Renewable Energy Credits (RECs) in the RPS.
  - 1. Provide ongoing evaluation of the effects of REC trading on the renewable energy market and its efficacy in supporting RPS goals such that program corrections may be made as necessary, or modifications can be developed to enhance the program.
  - 2. Analyze REC trading to meet AB 32 targets to ensure it is developed in a manner that is complementary to, and not in contradiction to, REC trading for RPS requirements.
  - 3. Analyze REC trading in the voluntary market and evaluate how regulatory actions may help or harm the voluntary market to provide the state with a useful tool in leveraging the state's efforts to advance renewable energy with private investment.
  - 4. Analyze how REC trading systems are working in other states and countries with respect to advancing renewable technology development including their efforts in reducing greenhouse gas emissions.
- F. Evaluate and propose refinements or changes as necessary to any aspect of RPS implementation including: evaluating RPS eligibility, developing the RPS

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<sup>2</sup> Assembly Bill 32 (stats. 2006, ch. 488)

<sup>3</sup> California Office of the Governor, Executive Order S-3-05.

Procurement Verification Report, integrating renewable distributed generation into the RPS, conducting interim tracking until an automated regional system is in place, integrating verification of delivery from out-of-state facilities into the tracking system, and evaluating options to provide financial support for RPS-eligible facilities.

- G. Assist Energy Commission staff in evaluating renewable energy potential and cost trends in California and the Western Interconnect.
- H. Assist Energy Commission staff in evaluating the technical potential and feasibility of specific renewable energy technologies to meet the RPS goals.
- I. Assist Energy Commission staff in evaluating transmission constraints and options to cost-effectively develop transmission needed to meet RPS goals.
- J. Assist Energy Commission staff in developing and evaluating new strategies to advance renewable energy development in California beyond the 20 percent by 2010 target, including:
  - 1. Provide technical assistance to evaluate feed-in tariffs for renewable resources as a mechanism to meet statewide renewable targets.
  - 2. Provide technical assistance to design and implement a feed-in tariff program, if requested, consistent with any applicable state policies and statutes.
- K. Assist the Energy Commission in developing, implementing, and evaluating how to effectively and efficiently implement the California RPS with consideration of local, regional, state, and federal regulatory programs and voluntary renewables programs.
- L. Provide other needed technical support that arises for the RPS Program.

#### **Task 4 – New Renewable Facilities Program (NRFP)**

The objective of the NRFP is to provide support to new renewable generating facilities including those whose generation will count toward the state's goal of 20 percent renewables by 2010, to help increase the amount of renewable electricity generation in California's power mix. Additionally, the NRFP is to provide support in the most efficient, equitable, and cost-effective manner possible.

Originally, funds were distributed through auctions in which project developers submitted bids for the amount of support needed to allow their project to compete in the electricity market. Bids were in the form of a cents/kWh incentive amount, and included an estimate of the first five years of generation from the project. Three auctions were held between June 1998 and September 2001. Winning projects were required to meet a series of project development and construction milestones between the auction in which they participated and their expected on-line date, and to submit regular reports to the Energy Commission describing their progress toward coming on-line. These milestones and reports are designed to enable the Energy Commission to track the progress of projects and distinguish projects with a serious intent and opportunity of becoming operational.



With the passage of SB 1038<sup>4</sup> and SB 1078<sup>5</sup> in 2002, production incentives for new renewable generating facilities are to be connected to California's RPS. Under these laws the Energy Commission was required to award production incentives as a result of competitive RPS solicitations run by IOUs, rather than through auctions administered by the Energy Commission. Additionally, the California RPS program re-defined "new" as beginning operation on or after January 1, 2002.

Under SB 1038 and SB 1078, renewable generators that were awarded a contract through a competitive RPS solicitation by the IOUs, could be eligible for NRFP production incentives from the Energy Commission. Eligible new or re-powered facilities priced above the market price referent (MPR), as determined by the CPUC, could apply for NRFP incentives from the Energy Commission to pay the difference between the contract price and the MPR. Production incentives were payable for a maximum of 10 years, and the Energy Commission had the authority to set caps on the amount of incentive payments paid per kWh, per facility, and per solicitation.

Existing law with respect to the NRFP changed recently with the enactment of SB 1036<sup>6</sup>, which took effect January 1, 2008. Under SB 1036, responsibility for the approval of funding for that portion of RPS contracts above the MPR is transferred to the CPUC. In addition, SB 1036 requires the Energy Commission to return any unencumbered funds collected for purposes of the NRFP pursuant to SB 1038 to the IOUs that collected such funds. Under SB 1036, the CPUC will direct these IOUs how to best use the funds. Although the bulk of the Energy Commission's responsibilities for implementing the NRFP are expected to end in the near future, because of SB 1036, the Energy Commission may still be called upon to assist the CPUC in implementing its new responsibilities under SB 1036. In addition, the Energy Commission remains responsible for the administration of previously encumbered NRFP funds.

Under this Task, the Contractor will:

- A. Evaluate and propose methods to levelize production incentives for new renewable facilities with long-term contracts to ensure that funds are used most efficiently and effectively.
- B. Devise a method by which Energy Commission staff can determine the need for, impact of, and ways to implement caps on production incentives for new renewable facilities.
- C. Conduct random audits of projects receiving NRFP production incentives to ensure that projects continue to meet eligibility requirements and maintain operations in accordance with contractual obligations.
- D. Assist Energy Commission staff in identifying RPS eligible generation from facilities under long-term contracts with IOUs originally entered into before September 26, 1996 pursuant to Public Utilities Code section 399.6 (c)(1)(C).

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<sup>4</sup> Senate Bill 1038 (stats. 2002, ch. 515)

<sup>5</sup> Senate Bill 1078 (stats. 2002, ch. 516)

<sup>6</sup> Senate Bill 1036 (stats. 2007, ch. 685)

- E. Provide technical expertise in the review of applications for RPS certification to ensure that applicants meet eligibility requirements for NRFP production incentives.
- F. Assess results of NRFP production incentive awards and awarding process to evaluate where improvements or changes may be required in the future to better meet the RPS goals with a minimum of administrative burden to Energy Commission staff.
- G. Provide technical expertise to assist staff in evaluating options to implement production incentives for new renewable facilities that support a time-adjusted MPR (the CPUC is considering developing MPRs that vary over time rather than set as a flat rate).
- H. Provide other needed technical support that arises for the NRFP, or for the CPUC's new NRFP-related responsibilities under SB 1036.

#### *Deliverables and Due Dates*

All work assignments will be made through specific work authorizations and will specify the schedule of deliverables.

### **Task 5 – Renewable Rebate Programs**

#### **Emerging Renewables Program (ERP)**

A primary goal of the Emerging Renewables Program (ERP) is to accelerate market development of specified emerging renewable generation technologies designed to provide part or all of a customer's on-site electrical needs by providing monetary incentives in the form of rebates to reduce the up-front costs of purchasing such technologies.

The ERP replaced the Energy Commission's Emerging Renewables Buydown Program, which focused on four emerging technologies: solar photovoltaics (PV), small wind turbines, fuel cells using renewable fuels, and solar thermal electric generation. Under the Energy Commission's Investment Plan, additional technologies may be added to the list of technologies that qualify for incentives under the ERP. The ERP continued accepting applications for these four eligible technologies through 2006. Effective January 1, 2007, only small wind systems (rated output of 50 kW or less) and fuel cells using renewable fuel, are eligible. The CSI and NSHP, discussed later in the section, have replaced the solar components of both the Energy Commission's ERP and the CPUC's Self-Generation Incentive Program.

Because emerging technologies generally have high up-front investment costs, are not well known in the marketplace and the market infrastructure has not been fully developed, accelerating market activity requires solutions to overcome these barriers. Addressing and prioritizing these market barrier issues can better achieve an orderly and sustainable market development plan. To this end, utilizing limited program funds as efficiently as possible and practicable is critical to the ERP's success.

## **New Solar Homes Partnership (NSHP)**

On January 12, 2006, Governor Schwarzenegger's proposed Million Solar Roofs Initiative was approved in substance by the CPUC and called the CSI. This action was subsequently codified by SB 1, which created the largest solar program of its kind in any state in the nation providing over \$3.35 billion in ratepayer funding over the next 10 years to help California move toward a cleaner energy future and help bring the costs of solar electricity down for California consumers. The goal of the CSI is to increase the amount of installed solar generating capacity in the state by 3,000 megawatts (MW) by the end of 2016. The CSI will be a major source of dependable and environmentally-friendly electricity, and is a major tool in the state's promise to address climate change and meet the Governor's goals to reduce greenhouse gas emissions.

For customers of IOUs, there will be two programs, one administered by the CPUC and one administered by the Energy Commission. The CPUC will be responsible for overseeing incentives to existing residential customers (retrofits), including affordable housing, and all nonresidential customers (also retrofits). The Energy Commission's mandate is to achieve 400 MW of new solar capacity on new, highly energy efficient homes by the end of 2016. The NSHP was created to achieve this objective, and an advisory committee was formed to provide additional industry guidance particularly during the development of the program. The NSHP intends to provide \$400 million in financial incentives during the program period and non-financial assistance in the form of builder and market support to help create this self-sustaining market. Both programs became operational January 1, 2007.

The Energy Commission's NSHP will work with builders and developers who install photovoltaic (PV) systems on new residential building construction, to incorporate high levels of energy efficiency and high-performing solar systems to help create a self-sustaining solar market where home buyers demand energy efficient solar homes. The NSHP will specifically target single family, multi-family and affordable housing markets. As of the end of August 2007, reservation applications for a total of 1096 homes have been received under the NSHP. This represents approximately 3.2 MW of potential solar capacity.

## **Senate Bill 1 (SB 1)**

Under SB 1, customers served by IOUs and local publicly-owned electric utilities in California will be afforded the opportunity to receive incentives for installing their own solar systems. SB 1 directs the Energy Commission to establish eligibility criteria, conditions for incentives and rating standards for all rate payer funded solar energy incentive programs in the state. Furthermore, the Energy Commission must coordinate with the CPUC to accomplish a variety of solar related activities to achieve the overall program goals of installing 3000 MW of solar electric capacity and improve energy efficiency for new and existing buildings.

Technical assistance is required to assist staff in the following aspects of program development, implementation, and administration:

- A. Program processes, including database and web improvements

1. Reorganize or build database structure to more efficiently implement data tracking and review of applications
2. Develop or modify web-based rebate program forms
3. Develop or provide maintenance for web tools that estimate energy production and economic evaluation of PV or wind energy systems
4. Modify an internet-based automated application and payment request process
5. Develop or modify an internet-based data acquisition system
6. Evaluate and recommend changes to the program's application and review processes to streamline the processes and minimize delays.

B. Market research

1. Determine how the various market segments are evolving
2. Evaluate level of incentives needed
  - By technology
  - By market segment type
  - Time frame needed for incentives
  - Evaluate market impact from tax credits and deductions
3. Assess the market for small-scale renewable technologies regionally and worldwide
  - Market trends
  - Costs
  - Product adequacy – supply and demand issues
  - Coordination with other incentive programs.

C. Product development

1. Manufacturing
  - Determine relationship between production capacity, market penetration, and cost reduction
  - Determine funding requirements to reach cost-effective small-scale renewable technology systems
  - Evaluate technology innovations that can reduce costs
2. Retail Infrastructure
  - Identify ways to optimize infrastructure and related issues
  - Identify ways to expand infrastructure
  - Assess existing business models for small-scale renewable technology systems

- Develop new business models for growing the market for emerging renewable technologies.
- D. Performance-based incentives
1. Transitioning the market from capacity incentives (rebates) to performance-based or expected performance-based incentives
    - Assess appropriateness of hybrid approach (combining capacity incentive with performance incentive)
  2. Assess the appropriate incentive level and payment period for each customer class
  3. Determine metering and data reporting requirements
  4. Conduct or assist with an evaluation of the pilot Performance-Based Incentive Program which began in early 2005.
- E. Reliability and dependability of technologies
1. Continue and expand efforts to increase reliability and dependability
    - Monitoring performance of systems
    - Verification Program.
- F. Financing and financial issues
1. Assess tax treatment of rebates and performance incentives
  2. Evaluate consumer finance options including energy efficient mortgages, mortgage guarantees, Cal PERS mortgage allowance and other opportunities for homes with solar
  3. Appropriateness of developing a revolving loan program.
- G. New solar initiative, including SB 1
1. Assess appropriateness of mandating PV on new residential buildings
  2. Determine how PV should be integrated into California's Building Energy Efficiency Standards (Title 24)
  3. Determine how best to provide incentives to target solar energy technologies to specific geographic regions
  4. Determine how best to incorporate advanced metering and time of use with energy efficient solar homes and buildings
  5. Monitor and evaluate non-PV solar technologies and review test data.
- H. Other renewable technologies
1. Determine how best to provide incentives to target other emerging renewable technologies to specific geographic regions
- I. Policies to enhance the continued development of emerging renewable technologies



1. Evaluate and recommend policies to coordinate ERP and NSHP activities with Consumer Education Account activities
    - Training and workshops
    - Education and information materials for contractors, builders, consumers and others.
  2. Evaluate and recommend policies to coordinate activities under SB 1
- J. Conduct audits of program participants, as necessary, to ensure compliance with program requirements.
1. Audit of NSHP participants
  2. Audit of CSI and/or publicly owned utility solar electric incentive program participants (SB 1 activity)
- K. SB 1 related assistance, including assistance with the development, implementation, and administration of the Energy Commission's statewide eligibility criteria, conditions for incentives and rating standards.
- L. Provide other needed technical support that arises for the ERP, NSHP, and CSI efforts (including ongoing work as a result of SB 1.)

#### Deliverables and Due Dates

All work assignments will be made through specific work authorizations and will specify the schedule of deliverables.

#### **Task 6 – Consumer Education Program**

The Consumer Education Program was created and allocated funds under the REP, to support renewable energy consumer education activities. In May 2004, the Energy Commission revised the *Consumer Education Guidebook* to clarify the type of activities that qualify for funding, including the development of information, products, and the processes that promote renewable energy markets by verifying and tracking energy generation.

Since 1999, the Consumer Education Program has funded grant projects awarded for renewable energy information and outreach activities; contracts in support and development of public awareness campaigns; and contracts in support and development of WREGIS to address long-term RPS tracking needs; updating renewable energy marketing materials for distribution at workshops, conferences, and tradeshow; and other Consumer Education activities promoting renewable energy.

#### **WREGIS**

In August 2003, the Energy Commission started collaborating with the Western Governors' Association to design and implement a regional renewable energy registry and tracking system, known as WREGIS. WREGIS is being established to meet the legislative mandate of SB 1078 to ensure the electrical output of renewable energy generation facilities is counted only once for the purpose of the RPS and for verifying

retail product claims in California and other western states within the Western Electricity Coordinating Council (WECC).

The development of WREGIS followed a very extensive stakeholder process which included surveying market participants, establishing working groups to draft the operating rules and functional requirements and establishing the WECC as the appropriate institutional home for WREGIS. The WECC will not incur any costs for housing WREGIS. The Energy Commission will cover costs for the WREGIS Administrator and other WECC costs related to housing WREGIS, which will be funded by the Consumer Education Program. Once it becomes operational, costs of administering WREGIS at the WECC are estimated to be \$2.2 million for a three-year operational phase and a one-year close-out phase.

In July 2004, the WECC Board of Directors approved adding the WREGIS Committee as a Board Committee of WECC and establishing the administrative operations of WREGIS at WECC. The WREGIS Committee consists of seven members: four elected representatives of industry, states/provinces, generators, and load-serving entities; and three appointed members from the Energy Commission, Western Governor's Association, and the WECC. The WREGIS Committee provides the governance for the WREGIS Program, including the setting of WREGIS fees and the fee structure, which were approved in April 2007 and will be implemented in January 2008. WREGIS became operational in June 2007.

The primary goals of the Consumer Education Program are:

- Raise consumer awareness of renewable electricity generation and its benefits.
- Increase purchases of small-scale emerging renewable systems installed on customer premises.
- Leverage strategic alliances and partnerships with organizations connected to renewable energy in California.
- Develop and provide credible information, products, and processes that promote the renewable energy market by verifying and tracking energy generation, verifying retail product claims and verifying compliance with renewable energy policies such as the RPS (WREGIS-related goal).

To meet these goals, the technical assistance under this contract will have the following objectives:

- A. Understand consumer attitudes, perceptions, knowledge and awareness about renewable energy technologies and their costs and benefits.
- B. Raise consumer awareness about renewable energy resources, available technologies and opportunities in California.
- C. Increase consumer knowledge about the benefits and mechanics of adopting renewable energy technologies.
- D. Through outreach, marketing and education, increase purchases of renewable energy technologies in the state.

- E. Conduct WREGIS-related tasks associated with modifications to WREGIS.
- F. Conduct audits of program participants, as necessary, to ensure compliance with program requirements.
- G. Provide other needed technical support that arises for the Consumer Education Program.

#### Deliverables and Due Dates

All work assignments will be made through specific work authorizations and will specify the schedule of deliverables.

#### Task 7 – Evaluation

##### A. REP

The REP is a uniquely designed, market-based financial incentive program that must operate under high levels of uncertainty in market, regulatory, and technology development conditions. Tracking and predicting these developments is an extremely complex undertaking and requires unique and special skills in economic and statistical modeling of a new market, anticipation of development and performance of advanced electric generation technologies, and continuously adjusting the design of the REP to be consistent with and take advantage of these developments. Methods proposed must, by necessity, accommodate the diverse needs of the six program elements that make up the REP, as well as the overall REP design.

To address these parameters, the following technical assistance is required to assist staff:

1. Propose methods for monitoring and predicting market, regulatory, and technology developments and incorporating these into REP design adjustments.
2. Develop techniques to isolate the effects of the REP from other influences in the market; i.e., how much of a market result is due to the operation of the REP and how much is due to other influences interwoven with the operation of the REP.

##### B. Integrated Energy Policy Report (IEPR)

This Energy Commission report to the Legislature and Governor evaluates and establishes the state's energy policies and is adopted every two years with an update every other year. The 2006 update to the *Integrated Energy Policy Report (IEPR)* featured a midcourse review of the RPS.<sup>7</sup> Additional RPS and REP topics will be addressed in the upcoming 2007 IEPR which is scheduled to be finalized and adopted by the Energy Commission in late November, 2007 and published in

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<sup>7</sup> California Energy Commission, *2006 Integrated Energy Policy Report Update*, January 2007, publication number CEC-100-2006-001-CMF.

December, 2007. Technical support is anticipated to be needed for the 2008 and 2010 IEPR Updates as well as the 2009 IEPR. Support will be used to analyze RPS and REP policy and implementation issues and contribute to the basis for policy recommendations in future IEPRs. These issues include but are not limited to the following:

- Establishing a renewables feed-in tariff<sup>8</sup> to support post-2010 renewable development.
- Portfolio analysis in electric utility resource planning.
- Renewable energy Policy issues related to greenhouse gas emission reductions, including potential allowances and emissions credits for a market-based compliance system under AB 32.

These following areas require technical expertise beyond that available through Energy Commission staff, and the analysis is critical for shaping renewable energy policy in California.

1. Analysis of alternative incentive structures both nationally and internationally, in order to meet the state's longer-term goals of 33 percent renewable, and analysis of whether feed-in tariffs would spur additional renewable development.
2. Analysis of a portfolio-based valuation of renewable energy to fully account for the benefits of renewables.
3. Identify and evaluate technological, economic, and environmental risks associated with each renewable technology type and any variations resulting from various size configurations per technology.
4. Analyze and identify greenhouse gas emission effects resulting from existing and potential renewable energy policies and programs, including interactions between California, western states, federal and international greenhouse gas and climate change mitigation policies and programs.

#### C. Numerical Targets

A goal of the REP is to meet the state's accelerated RPS goals, with a long-term view of developing a self-supporting renewable energy supply in California. The law sets a goal that 20 percent of the electricity retail sales in California should be served with renewable electricity by 2010. The Governor has supported a longer term goal of achieving a 33 percent target by 2020. Also, the Energy Commission is considering developing utility-specific goals.

Technical assistance is required to assist staff with the following:

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<sup>8</sup> A feed-in tariff involves the obligation on the part of a utility to purchase electricity generated by renewable energy producers in its service area at a tariff determined by public authorities and guaranteed for a specific period of time.

1. Develop methods to evaluate progress toward meeting state RPS targets that are articulated in statute and state policy.

D. Verification and Compliance Audit

Technical assistance is required to assist staff with the following:

1. Develop and perform audits to ensure program participants are complying with Program requirements and requirements of other government and utility-related funding programs, and to make necessary programmatic adjustments.

E. Provide other needed technical support that arises for REP evaluation.

**Deliverables and Due Dates**

All work assignments will be made through specific work authorizations and will specify the schedule of deliverables.

**NOTE:**

**Computer System Compatibility** – The Contractor shall prepare and submit all products to the Energy Commission Contract Manager in a format compatible with the following Energy Commission-supported software or the most recent version of Energy Commission-supported software upon notification by the Energy Commission Contract Manager.

**Software Type**

Word Processing	Microsoft Office XP (Word 2000)
Spreadsheet and Database	Microsoft Office XP (Excel 2000, Access 2000)
Charts/Graphics	Microsoft Office XP
Presentations	Microsoft Office XP (Power Point 2000)
Desktop Publishing	Adobe Page Maker 7

**Deliverables and Due Dates**

All work assignments will be made through specific work authorizations and will specify the schedule of deliverables. The Contractor will prepare and submit the following to the Contract Manager:

**Monthly Progress Report.** The Contractor shall prepare a monthly progress report that summarizes all activities conducted by the Contractor and team. This includes a summary of Agreement expenditures to date. The monthly progress report is due to the Contract Manager within 15 working days after the end of the month. The Contract Manager will specify the report format and the number of copies to be submitted. All monthly progress reports will coincide with the invoice period.

**Invoice.** The Contractor will prepare a monthly invoice for all Agreement expenses performed for assigned work authorizations. The invoice is to be submitted to the



Energy Commission's Accounting Office. The Contract Manager will specify the invoice format.

Draft and Final Contract Report. A draft Final Report is due three months prior to the end of the Agreement. The Final Report is due no later than fifteen days prior to the end of the Agreement. The Final Report shall include an analysis of:

- The work accomplishments of the Agreement.
- The effectiveness of the Agreement in meeting the objectives of the program
- Future activities recommended to increase the effectiveness of the program and this Agreement.



## EXHIBIT B

### Budget Detail and Payment Provision

#### 1. INVOICING PROCEDURES:

- A. For services satisfactorily rendered, and upon receipt and approval of invoices, the Energy Commission agrees to compensate Contractor for actual allowable expenditures incurred in accordance with the rates specified in this Exhibit B. The rates in Exhibit B are rate caps, or the maximum amount allowed to be billed. Contractor can only bill for actual expenses incurred for hours worked at the Contractor's actual direct labor, fringe, and indirect rates, not to exceed the rates specified in Exhibit B.
- B. Invoices shall be submitted in duplicate not more frequently than monthly. The following certification shall be included on each invoice and signed by an authorized official of the Contractor:

*I certify that this invoice is correct and proper for payment, and reimbursement for these costs has not and will not be received from any other sources, including but not limited to a Government Entity contract, subcontract or other procurement method.*

- C. The Energy Commission will accept computer generated or electronically transmitted invoices provided Contractor sends a hard copy the same day to the Energy Commission, the address is noted below and in Agreement Contact List.

California Energy Commission  
Accounting Office, MS-2  
1516 9<sup>th</sup> Street  
Sacramento, California 95814

- D. A request for payment shall consist of, but is not limited to, the following.
- 1) Agreement number, date prepared, and billing period.
  - 2) Contractor's actual hourly labor rates by individual.
  - 3) Operating expenses, e.g., equipment, travel, and miscellaneous, as well as receipts for those expenses.
  - 4) Copy of subcontractor invoices. Identify on invoice summary page if subcontractor is a California Certified Small Business or a Certified Disabled Veteran Business Enterprise and identify the total for current billing period.
  - 5) Fees (fringe, direct and indirect overheads, general and administrative, profit, etc.)

- 6) Match fund expenditures, if applicable.
- 7) Invoices shall identify charges by tasks, personnel, labor rates and hours, and expenses authorized by this Agreement or Work Authorizations, if applicable.
- 8) Work Authorization number, if applicable

E. As detailed in Exhibit A, Scope of Work:

- 1) A report that documents the progress of the work during the billing period, if applicable.
- 2) Any other deliverables due during the billing period.

2. **BUDGET CONTINGENCY CLAUSE:** It is mutually agreed that if the Budget Act of the current year and/or any subsequent years covered under this Agreement does not appropriate sufficient funds for the work identified in Exhibit A, this Agreement shall be of no further force and effect. In this event, the State shall have no liability to pay any funds whatsoever to Contractor or to furnish any other considerations under this Agreement and Contractor shall not be obligated to perform any provisions of this Agreement.

If funding for any fiscal year is reduced or deleted by the Budget Act for purposes of this program, the State shall have the option to either: cancel this Agreement with no liability occurring to the State, or offer an Agreement Amendment to Contractor to reflect the reduced amount.

3. **TRAVEL AND PER DIEM RATES:** Contractor shall be reimbursed for travel and per diem expenses using the same rates provided to non-represented state employees. Contractor must pay for travel in excess of these rates. Contractor may obtain current rates from the Energy Commission's Web Site at [http://www.energy.ca.gov/contracts/2003-03-05\\_TRAVEL\\_PER\\_DIEM.PDF](http://www.energy.ca.gov/contracts/2003-03-05_TRAVEL_PER_DIEM.PDF) and from the Department of Personnel Management Memorandum Reference Number 2006-045.

4. **RETENTION:** The Energy Commission shall retain from each invoice ten percent (10%) of that invoice, excluding equipment invoices. The retained amount shall be held and released only upon approval that the work has been satisfactorily completed and Final Report (if required) has been received and approved. Contractor must submit a separate invoice for the retained amount.

Retention may be released upon completion of tasks that are considered separate and distinct, i.e., the task is a stand-alone piece of work and could be done without the other tasks. The Budget will identify the tasks for which retention may be released prior to the end of the Agreement. Tasks for administration or management of the Agreement and/or subcontractors are not considered separate and distinct tasks.

5. **PAYMENT TERMS:**

Check all that apply:

- ☒ Monthly
- ☐ Quarterly
- ☐ One-Time Payment
- ☒ Itemized
- ☐ Flat Rate
- ☒ In Arrears
- ☐ Advance Payment to Public Prime Contractor Not to Exceed \$ \_ or \_\_\_\_ % of the Agreement Amount
- ☐ Advance Payment to Private Prime Contractor for Public Subcontractor, (PRC section 25620.3(d)) Not to Exceed \$ \_\_\_\_\_ or \_\_\_\_ % of the Subcontract Amount
- ☐ Reimbursement/Revenue
- ☐ Other (Explain)

6. **CONDITIONS:**

- A. No payment shall be made in advance of services rendered.
- B. Payments shall be made to Contractor for undisputed invoices. An undisputed invoice is an invoice submitted by the Contractor for services rendered and for which additional evidence is not required to determine its validity. The invoice will be disputed if all deliverables due for the billing period have not been received and approved, if the invoice is inaccurate, or if it does not comply with the terms of this Agreement. If the invoice is disputed, Contractor will be notified via a Dispute Notification Form within 15 working days of receipt of the invoice.
- C. Payment will be made in accordance with, and within the time specified, in Government Code Chapter 4.5, commencing with Section 927.
- D. Final invoice must be received by the Energy Commission no later than 30 calendar days after the Agreement termination date.
- E. The State will pay for State or local sales or use taxes on the services rendered or equipment, parts or software supplied to the Energy Commission pursuant to this Agreement. The State of California is exempt from Federal excise taxes, and no payment will be made for any taxes levied on employee's wages.
- F. No payment will be made for costs identified in Contractor invoices that has or will be reimbursed by any other source, including but not limited to a Government Entity contract or subcontract or other procurement Agreement.



7. **BUDGET REALLOCATIONS**

Contract Manager may move up to 10% of the total Agreement amount between tasks, line items or categories without formal amendment, by providing written notice with the revised budget to Contractor and Contract Officer.

8. **BUDGET DETAIL**

See attached Budget Detail

# Exhibit B

## BUDGET DETAIL

	FY 07/08 Tech Support	FY 07/08 RRTF Program	FY 08/09 Tech Support	FY 09/10 Tech Support	PENDING Contingent Funds*	Other Funds*	TOTAL
Task 1: Contract Management & Reporting Requirements	\$150,000		\$150,000	\$150,000		\$100,000	\$550,000
Task 2: Existing Program	\$15,000		\$20,000	\$20,000			\$55,000
Task 3: Renewables Portfolio Standard	\$135,000		\$200,000	\$200,000		\$300,000	\$835,000
Task 4: New Program	\$15,000		\$31,000	\$31,000			\$77,000
Task 5: Renewable Rebate Programs	\$87,000		\$87,000	\$87,000		\$155,000	\$416,000
Task 6: Consumer Education Program		\$1,000,000					\$1,000,000
Task 7: Evaluation	\$78,000		\$160,000	\$160,000		\$350,000	\$748,000
<b>FY BUDGET TOTALS</b>	<b>\$480,000</b>	<b>\$1,000,000</b>	<b>\$648,000</b>	<b>\$648,000</b>		<b>\$905,000</b>	<b>\$3,681,000</b>

\*Additional funding contingent upon other funds becoming available during the contract term including any amendments entered into hereafter.

### Pre-contract redirections from FY 07/08 \$675,000:

\$50,000 for ERP/NSHP Peak Load Assistance Contract  
 \$90,000 for NSHP Database Contract  
 \$27,000 for NSHP Outsourcing Contracts to IOUs  
 \$28,000 for Operating

**Total Re-directions to date \$195,000**

### Pre-contract redirections from FY 08/09 & 09/10 \$675,000:

(\$27,000) for NSHP Outsourcing Contracts to IOUs

**Total Re-directions to date \$46,000**



**Exhibit B**  
**Attachment B-1**  
**Form B-1, Labor Rates**

**FORM B-1 LABOR RATE EVALUATION (Primary Contractor and Subcontractors)**

**Bidder/Contractor:** KEMA, Inc.

*This table is to be completed for each firm that is part of the contract team. List all support personnel whose hours will appear on invoices*

**PRIMARY CONTRACTOR:**

**COMPANY:** KEMA, Inc.

**Technical Specialty:** Contract management, renewable energy policies, transmission & Distribution, energy markets, database development, program evaluations

Personnel Name	Classification	A		B	C	D
		Base Hourly Rate 2007 (\$/hr)	Base Hourly Rate for 3 years \$/Hr	Overhead + G&A + Indirect Costs (%)	Agency Profit/Fee (%)	TOTAL LOADED RATE* [(A)+(AxB)] x (1+C) (\$/hr)
Karin Corfee	Senior Principal Consultant	\$ 68.80	\$ 71.55	198.2%	10.0%	\$ 234.70
Nellie Tong	Senior Analyst	\$ 33.23	\$ 34.56	198.2%	10.0%	\$ 113.36
Bill Brooks**	Senior Engineer	\$ 150.00	\$ 155.00	25.0%	10.0%	\$ 213.13
Elena Schmid**	Senior Principal Consultant	\$ 80.00	\$ 83.20	88.2%	10.0%	\$ 172.24
Liz Hicks	Senior Principal Consultant	\$ 68.80	\$ 71.55	198.2%	10.0%	\$ 234.70
Doug Kneale	Senior Consultant	\$ 47.75	\$ 49.66	198.2%	10.0%	\$ 162.89
Josh Kessler	Senior Researcher	\$ 27.50	\$ 28.60	198.2%	10.0%	\$ 93.81
Pete Baumstark	Engineer	\$ 40.00	\$ 41.60	198.2%	10.0%	\$ 136.46
Sam Golding	Analyst	\$ 26.33	\$ 27.38	198.2%	10.0%	\$ 89.82
Karen Valter	Project Administrator	\$ 17.40	\$ 18.10	198.2%	10.0%	\$ 59.36
Betty Seto	Senior Analyst	\$ 33.23	\$ 34.56	198.2%	10.0%	\$ 113.36
Kevin Price	Analyst	\$ 26.33	\$ 27.38	198.2%	10.0%	\$ 89.82
Nehemiah Stone	Principal Consultant	\$ 63.00	\$ 65.52	198.2%	10.0%	\$ 214.92
Eugene Kong	Principal Consultant	\$ 63.00	\$ 65.52	198.2%	10.0%	\$ 214.92
Xuemei Zhang	Principal Researcher	\$ 32.16	\$ 33.45	198.2%	10.0%	\$ 109.71
Steve Sherwood	Senior Analyst	\$ 33.23	\$ 34.56	198.2%	10.0%	\$ 113.36
Jackie Stalling	Senior Project Administrator	\$ 19.67	\$ 20.46	198.2%	10.0%	\$ 67.10
Rick Fioravanti	Senior Consultant	\$ 47.75	\$ 49.66	198.2%	10.0%	\$ 162.89
Dick Wakefield	Executive Consultant	\$ 84.00	\$ 87.36	198.2%	10.0%	\$ 286.56
David Korinek	Senior Principal Consultant	\$ 68.80	\$ 71.55	198.2%	10.0%	\$ 234.70
Ali Ipakchi	Executive Consultant	\$ 84.00	\$ 87.36	198.2%	10.0%	\$ 286.56
Hans Cleijne	Senior Principal Consultant	\$ 68.80	\$ 71.55	198.2%	10.0%	\$ 234.70
Frits Verheij	Senior Principal Consultant	\$ 68.80	\$ 71.55	198.2%	10.0%	\$ 234.70
Karen Maoz	Engineer	\$ 40.00	\$ 41.60	198.2%	10.0%	\$ 136.46
Daria Mashnik	Researcher	\$ 23.29	\$ 24.22	198.2%	10.0%	\$ 79.45
Greg Reed	Executive Consultant	\$ 84.00	\$ 87.36	198.2%	10.0%	\$ 286.56
Andy Brydges	Senior Consultant	\$ 47.75	\$ 49.66	198.2%	10.0%	\$ 162.89
Bobbi Tannenbaum	Principal Consultant	\$ 63.00	\$ 65.52	198.2%	10.0%	\$ 214.92

Elena Schmid and Bill Brooks are casual employees and therefore have different markups.

\* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.

**Exhibit B**  
**Attachment B-1**  
**Form B-1, Labor Rates**

**SUBCONTRACTORS:**

*This table is to be completed for each firm that is part of the contract team. List all support personnel whose hours will appear on invoices*

**COMPANY: Aspen Environmental Group**

**Technical Specialty: Environmental and engineering services**

Personnel Name	Classification	A	B	C	D
		Base Hourly Rate (\$/hr)	Overhead + G&A + Indirect Costs (%)	Agency Profit/Fee (%)	TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)
Carl Linvill	Director Energy Planning	\$80.00	131.00%	10%	\$203.28
Suzanne Phinney	Senior Energy Analyst	\$73.00	131.00%	10%	\$185.49
Susan Lee	V.P. San Francisco Operations	\$70.00	131.00%	10%	\$177.87
Thomas Murphy	V.P. Sacramento Operations	\$67.25	131.00%	10%	\$170.88
Chris Cooke	Energy Analyst	\$26.50	131.00%	10%	\$67.34
Will Walters	Specialist II	\$56.00	131.00%	10%	\$142.30
Brewster Birdsall	Specialist II	\$56.00	131.00%	10%	\$142.30

\* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.

**COMPANY: Bates White**

**Technical Specialty: Economics consulting**

Personnel Name	Classification	A	B	C	D
		Base Hourly Rate (\$/hr)	Overhead + G&A + Indirect Costs (%)	Agency Profit/Fee (%)	TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)
Lesser, Jonathan	Partner	120.00	305%	-2.3%	475
Puga, Nicolas	Principal	106.50	305%	-1.5%	425
Yang, Spencer	Manager	84.20	305%	2.6%	350
Su, Xuejuan	Senior Consultant	73.00	305%	-7.0%	275
Ciganda, Alberto	Senior Consultant	73.00	305%	-7.0%	275

\* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.

**Note:**

These are estimated rates only and have not been prepared in conformance with FAR, CAS or DCAA accounting standards. Bates White does not perform work on a cost-plus basis and does not maintain accounting records to support the development of cost-plus rates.



**Exhibit B**  
**Attachment B-1**  
**Form B-1, Labor Rates**

<b>COMPANY:</b> BEW Engineering					
<b>Technical Specialty:</b>					
<p><i>Engineering consulting services, research and development in electrical power systems for bulk power and distributed energy resource applications. Expertise in distributed generation, renewable energy systems (primarily wind and PV), and power electronics, involvement with large-scale transmission-level projects and distributed energy resources for utility-connected and remote stand-alone applications.</i></p> <p><i>General areas of expertise include:</i></p> <p><i>Energy system and component evaluation, commercial and prototype</i>  <i>Energy system electrical and mechanical design and installation support</i>  <i>Energy system commissioning, troubleshooting, and failure analysis</i>  <i>Engineering and economic analysis and studies</i>  <i>Design review and input for new products</i>  <i>Product and IP development (patent, trademark and copyright)</i>  <i>Domestic and international standards development</i>  <i>Training and Workshops</i>  <i>Technical writing</i>  <i>Data acquisition</i>  <i>Data analysis and reporting</i>  <i>Test system/equipment development</i>  <i>Hardware and software development</i></p>					
Personnel Name	Classification	A Base Hourly Rate (\$/hr)	B Overhead + G&A + Indirect Costs (%)	C Agency Profit/Fee (%)	D TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)
Peter Monroe	Designer, Drafter	33.75		211%	105
Elaine Pandolfo	Office Manager	30.00		133%	70
Bill Erdman	President	110.00		105%	225
Chuck Whitaker	Principal	110.00		82%	200
Mike Bhenke	Principal	110.00		82%	200
Jeff Newmiller	Project Engineer	55.00		200%	165
Colleen O'Brien	Project Engineer	55.00		200%	165
Brad Eccles	Project Engineer	47.50		247%	165
Doug Blodgett,	Senior Engineer	77.00		140%	185
Tim Townsend	Senior Engineer	57.50		222%	185
<p>* The loaded hourly rate shall include overhead, fringe benefits, G&amp;A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.</p>					
<b>COMPANY:</b> Bite Communications					
<b>Technical Specialty:</b> Integrated Communications (marketing and public relations)					
Personnel Name	Classification	A Base Hourly Rate (50%)	B Overhead + G&A + Indirect Costs (35%)	C Agency Profit/Fee (15%)	D TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)
Kristina Skierka	Account Director	122.5	85.75	36.75	245
Sara Chapman	Senior Account Executive	82.5	57.75	24.75	165
Ben Eade	Account Executive	75	52.5	22.5	150
<p>* The loaded hourly rate shall include overhead, fringe benefits, G&amp;A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.</p>					

**Exhibit B**  
**Attachment B-1**  
**Form B-1, Labor Rates**

<b>COMPANY: Black &amp; Veatch</b>					
<b>Technical Specialty: Renewable Energy Consulting / Engineering</b>					
Personnel Name	Classification	A	B	C	D
		Base Hourly Rate (\$/hr)	Overhead + G&A + Indirect Costs (%)	Agency Profit/Fee (%)	TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)
Bill Roush	Consultant	37.87	162%	7.5%	106.48
Bret Harper	Consultant	43.99	162%	7.5%	123.67
Larry Stoddard	Project Manager	82.50	162%	7.5%	231.97
Ric O'Connell	Consultant	70.46	162%	7.5%	198.09
Ryan Jacobson	Project Manager	72.74	162%	7.5%	204.50
Ryan Pletka	Project Manager	91.02	162%	7.5%	255.92
Tim Mason	Project Manager	76.43	162%	7.5%	214.89
Shane Williams	Consultant	83.7	162%	7.5%	235.33
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					
<b>COMPANY: Mark Bolinger, Independent Consultant</b>					
<b>Technical Specialty: Markets and Policy</b>					
Personnel Name	Classification	A	B	C	D
		Base Hourly Rate (\$/hr)	Overhead + G&A + Indirect Costs (%)	Agency Profit/Fee (%)	TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)
Mark Bolinger	Principal	\$150	0	0	\$150
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					
<b>COMPANY: Center for Resource Solutions</b>					
<b>Technical Specialty: Renewable Energy Policy and Certified Tracking Systems</b>					
Personnel Name	Classification	A	B	C	D
		Base Hourly Rate (\$/hr)	Overhead + G&A + Indirect Costs (%)	Agency Profit/Fee (%)	TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)
Jan Hamrin	Executive Director	96.15	82%		175.00
Jennifer Martin	Deputy Director	71.43	82%		130.00
Meredith Wingate	Director	60.44	82%		110.00
Lars Kvale	Program Manager	41.21	82%		75.00
Jane Valentino	Program Analyst	35.71	82%		65.00
Jeff Swenerton	Communications Director	60.44	82%		110.00
Alex Pennock	Green-e Program Manager	41.21	82%		75.00
Andrew Nourafshan	Program Analyst	35.71	82%		65.00
Matthew Lehman	Manager	41.21	82%		75.00
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					

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**Attachment B-1**  
**Form B-1, Labor Rates**

<b>COMPANY: Clean Power Research</b>					
<b>Technical Specialty: Solar software and consulting services</b>					
		<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Personnel Name</b>	<b>Classification</b>	<b>Base Hourly Rate</b>	<b>Overhead + G&amp;A + Indirect Costs</b>	<b>Agency Profit/Fee</b>	<b>TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)</b>
		(\$/hr)	(%)	(%)	
Dr. Thomas E. Hoff	President	135	75%		236.25
Jeffrey Ressler	Product Line Manager	120	75%		210.00
Phillip Gruenhagen	Software Architect	110	75%		192.50
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					
<b>COMPANY: Energy and Environmental Economics, Inc.</b>					
<b>Technical Specialty: CPUC RPS Regulation, Utility Procurement, Greenhouse Gas Emissions Policy, RPS Program and Guidebooks</b>					
		<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Personnel Name</b>	<b>Classification</b>	<b>Base Hourly Rate</b>	<b>Overhead + G&amp;A + Indirect Costs</b>	<b>Agency Profit/Fee</b>	<b>TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)</b>
		(\$/hr)	(%)	(%)	
Dr. Ren Orans	Senior Partner	\$ 105	158%	11%	300
Dr. C.K. Woo	Senior Partner	\$ 105	158%	11%	300
Brian Horii	Senior Partner	\$ 93	158%	11%	265
Snuller Price	Partner	\$ 91	158%	11%	260
Arne Olson	Senior Consultant	\$ 58	253%	18%	240
Dr. Jim Williams	Senior Consultant	\$ 50	253%	18%	210
Eric Cutter	Senior Consultant	\$ 54	236%	16%	210
Michele Chait	Senior Consultant	\$ 57	223%	14%	210
Dr. Bill Morrow	Senior Consultant	\$ 50	253%	18%	210
Amber Mahone	Consultant	\$ 41	279%	21%	190
Jack Moore	Senior Associate	\$ 36	300%	23%	180
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					
<b>COMPANY: Ed Holt &amp; Associates, Inc.</b>					
<b>Technical Specialty: Renewable energy policy and regulatory analysis, RECs, and renewable energy attribute tracking</b>					
		<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Personnel Name</b>	<b>Classification</b>	<b>Base Hourly Rate</b>	<b>Overhead + G&amp;A + Indirect Costs</b>	<b>Agency Profit/Fee</b>	<b>TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)</b>
		(\$/hr)	(%)	(%)	
Edward A. Holt	President	\$175	\$0	\$0	\$175
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					

**Exhibit B**  
**Attachment B-1**  
**Form B-1, Labor Rates**

<b>COMPANY:</b> Richard D. Ely					
<b>Technical Specialty:</b> Renewable Energy, Science, Engineering, and Economics					
		<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Personnel Name</b>	<b>Classification</b>	<b>Base Hourly Rate</b>	<b>Overhead + G&amp;A + Indirect Costs</b>	<b>Agency Profit/Fee</b>	<b>TOTAL LOADED RATE*</b>
		(\$/hr)	(%)	(%)	[(A)+(AxB)] x (1+C)
Richard D. Ely	Sole Proprietor	100	0	0	100
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					
<b>COMPANY:</b> Engage Integrated Systems Technology					
<b>Technical Specialty:</b> Information Technology, Project Management, Green Technology, Disaster Recovery Planning, Disaster Proof Hardware					
		<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Personnel Name</b>	<b>Classification</b>	<b>Base Hourly Rate</b>	<b>Overhead + G&amp;A + Indirect Costs</b>	<b>Agency Profit/Fee</b>	<b>TOTAL LOADED RATE*</b>
		(\$/hr)	(%)	(%)	[(A)+(AxB)] x (1+C)
Louis Collins, MBA	Program Manager	\$85.00	80%	10%	\$168.30
Don Watson, MBA	Project Manager	\$83.00	80%	10%	\$164.34
Don Zook, PMP	Project Manager	\$83.00	80%	10%	\$164.34
Floyd Layher, PMP	Project Manager	\$83.00	80%	10%	\$164.34
Thom Collins	Systems Analyst II	\$77.00	80%	10%	\$152.46
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					
<b>COMPANY:</b> Edwin T.C. Ing					
<b>Technical Specialty:</b> Federal tax law and state renewable energy assistance programs					
		<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Personnel Name</b>	<b>Classification</b>	<b>Base Hourly Rate</b>	<b>Overhead + G&amp;A + Indirect Costs</b>	<b>Agency Profit/Fee</b>	<b>TOTAL LOADED RATE*</b>
		(\$/hr)	(%)	(%)	[(A)+(AxB)] x (1+C)
Edwin T.C. Ing	Principal	\$395.00	0	0	\$395.00
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					
<b>COMPANY:</b> Exeter Associates, Inc.					
<b>Technical Specialty:</b> Economic and public policy consulting					
		<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Personnel Name</b>	<b>Classification</b>	<b>Base Hourly Rate</b>	<b>Overhead + G&amp;A + Indirect Costs</b>	<b>Agency Profit/Fee</b>	<b>TOTAL LOADED RATE*</b>
		(\$/hr)	(%)	(%)	[(A)+(AxB)] x (1+C)
Kevin Porter	Vice President	68.08	130.0%	10.0%	172.24
Christina Mudd	Senior Analyst	50.72	130.0%	10.0%	128.31
Sari Fink	Engineer	33.90	130.0%	10.0%	85.77
Brett Morgenstern	Research Assistant	24.26	130.0%	10.0%	61.37
David Chen	Research Assistant	27.29	130.0%	10.0%	69.04
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					

**Exhibit B**  
**Attachment B-1**  
**Form B-1, Labor Rates**

<b>COMPANY: Galen Barbose (G.L. Barbose Consulting)</b>					
<b>Technical Specialty: electricity markets and pricing, utility regulation, economic analysis</b>					
		<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Personnel Name</b>	<b>Classification</b>	<b>Base Hourly Rate</b>	<b>Overhead + G&amp;A + Indirect Costs</b>	<b>Agency Profit/Fee</b>	<b>TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)</b>
		(\$/hr)	(%)	(%)	
Galen Barbose	Sole Proprietor	120	0	0	120
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					
<b>COMPANY: HDR Engineering</b>					
<b>Technical Specialty: Biomass Energy, Waste-to-Energy (WTE), and Renewable Energy Transmission</b>					
		<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Personnel Name</b>	<b>Classification</b>	<b>Base Hourly Rate</b>	<b>Overhead + G&amp;A + Indirect Costs</b>	<b>Agency Profit/Fee</b>	<b>TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)</b>
		(\$/hr)	(%)	(%)	(\$/hr)
Michael Brown	Renewable Energy Investment Specialist; Senior Vice President	118.67	175%	10%	358.99
Mike Greenberg	Biomass Energy and WTE Specialist; Vice President	81.55	175%	10%	246.70
Leslie Kramer	Solar PV and Energy Efficiency Specialist; Vice President	74.63	175%	10%	225.76
Lowell Rogers	Renewable Energy Transmission Specialist	57.59	180%	10%	177.38
Ian Monroe	Biomass Energy Engineer / Analyst II	40.06	185%	10%	125.58
Emily Leslie	Wind and Solar Energy Engineer / Analyst I	34.63	185%	10%	108.58
Lauren Casey	Energy Engineer / Analyst I	33.89	185%	10%	106.24
Tawni Tidwell	Energy Engineer / Analyst I	33.58	185%	10%	105.27
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					
<b>COMPANY: McNeil Technologies, Inc.</b>					
<b>Technical Specialty: Biomass systems, solar (PV and thermal) integration</b>					
		<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Personnel Name</b>	<b>Classification</b>	<b>Base Hourly Rate</b>	<b>Overhead + G&amp;A + Indirect Costs</b>	<b>Agency Profit/Fee</b>	<b>TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)</b>
		(\$/hr)	(%)	(%)	
Jack Whittier	Program Manager	\$ 61.40	107%	15%	\$146.16
Randy Hunsberger	Senior Engineer	\$ 36.75	107%	15%	\$87.48
Kevin Degroat	Operations Director	\$ 77.94	107%	15%	\$185.54
Lumas Kendrick	Senior Engineer	\$ 43.68	107%	15%	\$103.98
Jill Tietjen	Senior Engineer	\$ 65.53	107%	15%	\$156.00
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					
<b>COMPANY: Rickerson Energy Strategies, LLC</b>					
<b>Technical Specialty: Policy Analysis &amp; Development; Market Strategy &amp; Research; Planning &amp; Project Management; Training &amp; International Exchange</b>					
		<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Personnel Name</b>	<b>Classification</b>	<b>Base Hourly Rate</b>	<b>Overhead + G&amp;A + Indirect Costs</b>	<b>Agency Profit/Fee</b>	<b>TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)</b>
		(\$/hr)	(%)	(%)	
Wilson Rickersonn	Principal	110	0	0	110
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					

**Exhibit B**  
**Attachment B-1**  
**Form B-1, Labor Rates**

<b>COMPANY: Sustainable Energy Advantage, LLC</b>					
<b>Technical Specialty: Renewable Energy Market, Policy and Financial Analysis</b>					
Personnel Name	Classification	A	B	C	D
		Base Hourly Rate (\$/hr)	Overhead + G&A + Indirect Costs (%)	Agency Profit/Fee (%)	TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)
Robert C. Grace	President	\$ 202.50	\$ -	\$ -	\$ 202.50
Jason S. Gifford	Project Manager	\$ 140.00	\$ -	\$ -	\$ 140.00
Mimi Q. Zhang	Research Staff	\$ 60.00	\$ -	\$ -	\$ 60.00
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					
<b>COMPANY: THR Associates</b>					
<b>Technical Specialty: Renewable energy, climate, and environmental policy</b>					
Personnel Name	Classification	A	B	C	D
		Base Hourly Rate (\$/hr)	Overhead + G&A + Indirect Costs (%)	Agency Profit/Fee (%)	TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)
Thomas H. Rawls	President	110	0%	0%	110
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					
<b>COMPANY: Wiser Consulting</b>					
<b>Technical Specialty: renewable energy analysis, economics, and policy</b>					
Personnel Name	Classification	A	B	C	D
		Base Hourly Rate (\$/hr)	Overhead + G&A + Indirect Costs (%)	Agency Profit/Fee (%)	TOTAL LOADED RATE* [(A)+(AxB)] x (1+C)
Ryan Wiser	Principal	200	n/a	n/a	200
* The loaded hourly rate shall include overhead, fringe benefits, G&A, any other indirect costs and agency profit. This will be the amount that will show up on contract invoices.					



## **EXHIBIT D**

### **Special Terms and Conditions**

#### **1. CONTRACT MANAGEMENT:**

- A. Contractor may change Project Manager but the Energy Commission reserves the right to approve any substitution of the Project Manager.
- B. The Energy Commission may change the Contract Manager at any time and will send a written notice to the Contractor signed by the Contract Officer.
- C. Commission staff will be permitted to work side by side with Contractor's staff to the extent and under conditions that may be directed by the Energy Commission Contract Manager. In this connection, Commission staff will be given access to all data, working papers, etc., which Contractor may seek to utilize.
- D. Contractor will not be permitted to utilize Energy Commission personnel for the performance of services, which are the responsibility of Contractor unless the Contract Manager previously agrees to such utilization in writing and an appropriate adjustment in price is made. No charge will be made to Contractor for the services of Energy Commission employees while performing, coordinating or monitoring functions.

#### **2. STANDARD OF PERFORMANCE:**

Contractor shall be responsible in the performance of Contractor's/subcontractor's work under this Agreement for exercising the degree of skill and care required by customarily accepted good professional practices and procedures. Any costs for failure to meet these standards, or otherwise defective services, which require reperformance, as directed by Contract Manager or its designee, shall be borne in total by the Contractor/subcontractor and not the Energy Commission. In the event the Contractor/subcontractor fails to perform in accordance with the above standard the following will apply. Nothing contained in this section is intended to limit any of the rights or remedies which the Energy Commission may have under law.

- A. Contractor/subcontractor will reperform, at its own expense, any task, which was not performed to the reasonable satisfaction of the Contract Manager. Any work reperformed pursuant to this paragraph shall be completed within the time limitations originally set forth for the specific task involved. Contractor/subcontractor shall work any overtime required to meet the deadline for the task at no additional cost to the Energy Commission.
- B. The Energy Commission shall provide a new schedule for the reperformance of any task pursuant to this paragraph in the event that reperformance of a task within the original time limitations is not feasible.
- C. If the Energy Commission directs the Contractor not to reperform a task; the Contract Manager and Contractor shall negotiate a reasonable settlement for satisfactory services rendered. No previous payment shall be considered a waiver of the Energy Commission's right to reimbursement.

3. **SUBCONTRACTS:** Contractor shall enter into subcontracts with the following firms and/or individuals and shall manage the performance of the subcontractors.

Aspen Environmental Group; Bates White, LLC; Behnke, Erdman and Whitaker Engineering, Inc. (BEW Engineering); Bite Communications; Black & Veatch (B&V); Center for Resource Solutions (CRS); Clean Power Research, LLC (CPR); Ed Holt & Associates; Edwin T.C. Ing; Energy and Environmental Economics, Inc. (E3); Engage Integrated Systems Technology; Exeter Associates, Inc.; G.I. Barbose Consulting, HDR Engineering; Mark Bolinger, Independent Consultant; McNeil Technologies; Richard D. Ely; Rickerson Energy Strategies; Sustainable Energy Advantage, LLC (SEA); THR Associates; and Wiser Consulting.

- A. Nothing contained in this Agreement or otherwise, shall create any contractual relation between the State and any subcontractors, and no subcontract shall relieve the Contractor of his responsibilities and obligations hereunder. The Contractor agrees to be as fully responsible to the State for the acts and omissions of its subcontractors and/or persons either directly or indirectly employed by any of them as it is for the acts and omissions of persons directly employed by the Contractor. The Contractor's obligation to pay its subcontractors is an independent obligation from the State's obligation to make payments to the Contractor. As a result, the State shall have no obligation to pay or to enforce the payment of any monies to any subcontractor.
- B. Contractor shall be responsible for establishing and maintaining contractual agreements with and the reimbursement of each of, the subcontractors for work performed in accordance with the terms of this Agreement. Contractor shall be responsible for scheduling and assigning subcontractors to specific tasks in the manner described in this Agreement; coordinating subcontractor accessibility to Energy Commission staff, and submitting completed products to the Contract Manager.
- C. All subcontracts shall contain the following: 1) the audit rights and non-discrimination provision stated in the General Terms and Conditions (Exhibit C); 2) further assignments shall not be made to any third or subsequent tier subcontractor without additional written consent of the Contract Manager; and the confidentiality provisions in the Reports paragraph of this Agreement.
- D. Additions, Removal or Substitutions of Subcontractors

The Energy Commission reserves the right to replace a subcontractor, request additional subcontractors, and approve additional subcontractors requested by the Contractor. Such changes shall be subject to the following conditions:

- 1) If the Energy Commission or Contractor requires the replacement or addition of subcontractor(s), the subcontractor(s) shall be selected using 1) A competitive bid process conducted in conformance with the State's and the Energy Commission's procedures for competitive bids. For example, awards shall be made to the lowest bidder meeting the requirements of the bid document and obtaining a minimum of three bids. Contractor's competitive bid process shall be approved by the Contract Manager and

Contract Officer prior to release of the bid document. 2). The Energy Commission may direct Contractor to sole source a subcontract with a specific firm, once the Contract Manager has obtained sole source approval via the Energy Commission's internal procedures. The Contract Manager shall provide justification for the sole source subcontract to the Contracts Officer using the "Subcontractor Add" memo described below.

- 2) The Contract Manager shall complete and submit to the Contract Officer a "Subcontractor Add" memo. This memo identifies the new subcontractor and what bidding method was used to obtain subcontractors (competitive or sole source).
- 3) Contractor shall submit any proposed subcontracts not originally identified in Contractor's proposal, or any substitution of subcontracts to the Energy Commission for its approval prior to Contractor entering into it. Upon the termination of any subcontract, the Contract Manager shall be notified immediately.

**E. Disabled Veteran Business Enterprise (DVBE) Changes**

The Contractor shall use the DVBE companies identified in its proposal or in any certifications identifying DVBE to be used in this Agreement. Contractor's failure to adhere to the DVBE participation may be cause for termination. In the event a replacement of a DVBE is necessary, the Contractor shall request written approval, in advance, from the Contract Manager and the Contract Officer. The procedure for replacing any DVBE is:

- 1) Contractor shall inform Contract Manager and Contract Officer in writing of the reason for the DVBE replacement.
- 2) Contractor shall attempt to replace the DVBE with a new DVBE providing the same services or identify other services in the Agreement a new DVBE could provide. Contractor shall complete revised DVBE certification forms (provided by the Contract Officer) identifying the new DVBE. If replacement is not a DVBE, Contractor shall complete steps in compliance with good faith efforts and submit appropriate DVBE documentation to the Contract Officer

**4. PERFORMANCE EVALUATION:**

Consistent with Public Contract Code Sections 10367 through 10371, the Energy Commission shall, upon completion of this Agreement, prepare a performance evaluation of the Contractor. Upon filing an unsatisfactory evaluation with the Department of General Services, Office of Legal Services (DGS) the Energy Commission shall notify and send a copy of the evaluation to the Contractor within 15 days. The Contractor shall have 30 days to prepare and send statements to the Energy Commission and the DGS defending his or her performance. The Contractor's statement shall be filed with the evaluation in the Energy Commission's Contract file and with DGS for a period of 36 months and shall not be a public record.

5. **REPORTS:**

- A. **Progress and Final Reports:** Contractor shall prepare progress reports summarizing all activities conducted by Contractor to date on a schedule as provided in Exhibit A. At the conclusion of this Agreement, Contractor shall prepare a comprehensive Final Report, on a schedule as provided in Exhibit A.
- B. **Title:** Contractor's name shall only appear on the cover and title page of reports as follows:
- California Energy Commission  
Project Title  
Contractor Number  
By (Contractor)
- C. **Ownership:** Each report shall become the property of the Energy Commission.
- D. **Non-disclosure:** Contractor will not disclose data or disseminate the contents of the final or any progress report without written permission of the Contract Manager, except as provided in F, below. Permission to disclose information on one occasion or at public hearings held by the Energy Commission relating to the same shall not authorize Contractor to further disclose and disseminate the information on any other occasion. Contractor will not comment publicly to the press or any other media regarding its report, or Commission's actions on the same, except to Commission staff, Contractor's own personnel involved in the performance of this Contract, or at a public hearing, or in response to questions from a legislative committee. Notwithstanding the foregoing, in the event any public statement is made by the Energy Commission or any other party, based on information received from the Energy Commission as to the role of Contractor or the content of any preliminary or final report, Contractor may, if it believes the statement to be incorrect, state publicly what it believes is correct.
- E. **Confidentiality:** No record which has been designated as confidential, or is the subject of a pending application of confidentiality, shall be disclosed by the Contractor, Contractor's employees or any tier of subcontractors, except as provided in 20 California Code of Regulations, Sections 2506 and 2507, unless disclosure is ordered by a court of competent jurisdiction (20 California Code of Regulations, Sections 2501, et seq.). At the election of the Contract Manager, Contractor, Contractor's employees and any subcontractor shall execute a "Confidentiality Agreement," supplied by the Contract Manager or Contract Officer. Each subcontract shall contain provisions similar to the foregoing related to the confidentiality and nondisclosure of data.
- F. **Disclosure:** Ninety days after any document submitted by the contractor is deemed by the Contract Manager to be a part of the public records of the State, Contractor may, if it wishes to do so at its own expense, publish or utilize a report or written document but shall include the following legend:

## **"LEGAL NOTICE"**

**"This report was prepared as a result of work sponsored by the California Energy Commission. It does not necessarily represent the views of the Energy Commission, its employees, or the State of California. The Energy Commission, the State of California, its employees, contractors, and subcontractors make no warranty, express or implied, and assume no legal liability for the information in this report; nor does any party represent that the use of this information will not infringe upon privately owned rights."**

### **6. CONTRACT DATA, OWNERSHIP RIGHTS:**

- A. "Data" as used in this Agreement means recorded information, regardless of form or characteristic, of a scientific or technical nature. It may, for example, document research or experimental, developmental or engineering work, or be usable or be used to define a design or process, or to support a premise or conclusion asserted in any deliverable document required by this Agreement. The data may be graphic or pictorial delineations in media, such as drawings or photographs, data or information, etc. It may be in machine form, such as punched cards, magnetic tape or computer printouts, or may be retained in computer memory.
- B. "Deliverable data" is that data which, under the terms of this Agreement, is required to be delivered to the Energy Commission and shall belong to the Energy Commission.
- C. "Proprietary data" is such data as the Contractor has identified in a satisfactory manner as being under Contractor's control prior to commencement of performance of this Agreement, and which Contractor has reasonably demonstrated as being of a proprietary nature either by reason of copyright, patent or trade secret doctrines in full force and effect at the time when performance of this Contract is commenced. The title to "proprietary data" shall remain with the Contractor throughout the term of this Agreement and thereafter. The extent of the Energy Commission access to, and the testimony available regarding, the proprietary data shall be limited to that reasonably necessary to demonstrate, in a scientific manner to the satisfaction of scientific persons, the validity of any premise, postulate or conclusion referred to or expressed in any deliverable for this Agreement.
- D. "Generated data" is that data, which a Contractor has collected, collated, recorded, deduced, read out or postulated for utilization in the performance of this Contract. Any electronic data processing program, model or software system developed or substantially modified by the Contractor in the performance of this Contract at the Energy Commission's expense, together with complete documentation thereof, shall be treated in the same manner as "generated data." "Generated data" shall be the property of the Energy Commission, unless and only to the extent that it is specifically provided otherwise in this Agreement.
- E. As to "generated data" which is reserved to Contractor by the express terms hereof, and as to any pre-existing or "proprietary data" which has been utilized to support any premise, postulate or conclusion referred to or expressed in any

deliverable hereunder, Contractor shall preserve the same in a form which may be introduced as evidence in a court of law at Contractor's own expense for a period of not less than three years after receipt by the Energy Commission of the Final Report herein.

- F. Before the expiration of the three years, and before changing the form of or destroying any data, Contractor shall notify the Energy Commission of any contemplated action and the Energy Commission may, within thirty (30) days after notification, determine whether it desires the data to be preserved. If the Energy Commission so elects, the expense of further preserving data shall be paid for by the Energy Commission. Contractor agrees that the Energy Commission may at its own expense, have reasonable access to data throughout the time during which data is preserved. Contractor agrees to use its best efforts to furnish competent witnesses or to identify competent witnesses to testify in any court of law regarding data.

7. **PUBLIC HEARINGS:** If public hearings on the scope of work are held during the period of the Contract, Contractor will make available to testify the personnel assigned to this Agreement. The Energy Commission will reimburse Contractor for compensation and travel of the personnel at the Contract rates for the testimony which the Energy Commission requests.

8. **DISPUTES:** In the event of a Contract dispute or grievance between Contractor and the Energy Commission, both parties shall follow the following two-step procedure. Contractor shall continue with the responsibilities under this contract during any dispute.

A. Commission Dispute Resolution

The Contractor shall first discuss the problem informally with the Contract Manager. If the problem cannot be resolved at this stage, the Contractor must direct the grievance together with any evidence, in writing, to the Contracts Officer. The grievance must state the issues in the dispute, the legal authority or other basis for the Contractor's position and the remedy sought. The Contracts Officer and the Program Office Manager must make a determination on the problem within ten (10) working days after receipt of the written communication from the Contractor. The Contracts Officer shall respond in writing to the Contractor, indicating a decision and explanation for the decision. Should the Contractor disagree with the Contracts Officer decision, the Contractor may appeal to the second level.

The Contractor must prepare a letter indicating why the Contracts Officer's decision is unacceptable, attaching to it the Contractor's original statement of the dispute with supporting documents, along with a copy of the Contracts Officer's response. This letter shall be sent to the Energy Commission's Executive Director within ten (10) working days from receipt of the Contracts Officer's decision. The Executive Director or designee shall meet with the Contractor to review the issues raised. A written decision signed by the Executive Director or designee shall be returned to the Contractor within twenty (20) working days of receipt of the Contractor's letter. The Executive Director may inform the Energy Commission of the decision at an Energy Commission business meeting. Should the Contractor disagree with the Executive Director's decision, the Contractor



may appeal to the Energy Commission at a regularly scheduled business meeting. Contractor will be provided with the current procedures for placing the appeal on an Energy Commission Business Meeting Agenda.

**B. Binding Arbitration**

Should the Energy Commission's Dispute Resolution procedure above fail to resolve a contract dispute or grievance to the satisfaction of the Contractor, the Contractor and Commission mutually may elect to have the dispute or grievance resolved through binding arbitration. If one party does not agree, the matter shall not be submitted to arbitration. The arbitration proceeding shall take place in Sacramento County, California, and shall be governed by the commercial arbitration rules of the American Arbitration Association (AAA) in effect on the date the arbitration is initiated. The dispute or grievance shall be resolved by one (1) arbitrator who is an expert in the particular field of the dispute or grievance. The arbitrator shall be selected in accordance with the aforementioned commercial arbitration rules. If arbitration is mutually decided by the parties, arbitration is in lieu of any court action and the decision rendered by the arbitrator shall be final (not appealable to a court through the civil process). However, judgment may be entered upon the arbitrator's decision and is enforceable in accordance with the applicable law in any court having jurisdiction over this Agreement. The demand for arbitration shall be made no later six (6) months after the date of the contract's termination, despite when the dispute or grievance arose, and despite the applicable statute of limitations for a suit based on the dispute or grievance. If the parties do not mutually agree to arbitration, the parties agree that the sole forum to resolve a dispute is state court.

The cost of arbitration shall be borne by the parties as follows:

- 1) The AAA's administrative fees shall be borne equally by the parties;
- 2) The expense of a stenographer shall be born by the party requesting a stenographic record;
- 3) Witness expenses for either side shall be paid by the party producing the witness;
- 4) Each party shall bear the cost of its own travel expenses;
- 5) All other expenses shall be borne equally by the parties, unless the arbitrator apportions or assesses the expenses otherwise as part of his or her award.

At the option of the parties, any or all of these arbitration costs may be deducted from any balance of Contract funds. Both parties must agree, in writing, to utilize contract funds to pay for arbitration costs.

**9. TERMINATION:**

The parties agree that because the Energy Commission is a state entity and contracts on behalf of all Californian rate payers, it is necessary for the Energy Commission to be able to terminate, at once, upon the default of Contractors and to proceed with the work required under the Agreement in any manner the Energy Commission deems proper. Contractor specifically acknowledges that the unilateral termination of the Agreement by the Energy Commission under the terms set forth below is an essential term of the

Agreement, without which the Energy Commission would not enter into the Agreement. Contractor further agrees that upon any of the events triggering the unilateral termination the Agreement by the Energy Commission, the Energy Commission has the sole right to terminate the Agreement, and it would constitute bad faith of the Contractor to interfere with the immediate termination of the Agreement by the Energy Commission.

This Agreement may be terminated for any reason set forth below.

A. With Cause

In the event of any breach by the Contractor of the conditions set forth in this Agreement, the Energy Commission may, without prejudice to any of its legal remedies, terminate this Agreement for cause upon five (5) days written notice to the Contractor. In such event, Commission shall pay Contractor only the reasonable value of the services theretofore rendered by Contractor, as may be agreed upon by the parties or determined by a court of law, but not in excess of the contract maximum payable. "Cause" includes without limitation:

- 1) Failure to perform or breach of any of the terms or covenants at the time and in the manner provided in this Agreement; or
- 2) Contractor is not able to pay its debts as they become due and/or Contractor is in default of an obligation that impacts his ability to perform under this Agreement; or
- 3) It is determined after notice and hearing by the Energy Commission or the Executive Director that gratuities were offered or given by the Contractor or any agent or representative of the Contractor, to any officer or employee of the Energy Commission, with a view toward securing an Agreement or securing favorable treatment with respect to awarding or amending or making a determination with respect to performance of the Agreement; or
- 4) Significant change in Commission policy such that the work or product being funded would not be supported by the Energy Commission; or
- 5) Reorganization to a business entity unsatisfactory to the Energy Commission; or
- 6) The retention or hiring of subcontractors, or the replacement or addition of personnel that fail to perform to the standards and requirements of this Agreement.

B. Without Cause

The Energy Commission may, at its option, terminate this Agreement without cause in whole or in part, upon giving thirty (30) days advance notice in writing to the Contractor. In such event, the Contractor agrees to use all reasonable efforts to mitigate the Contractor's expenses and obligations hereunder. Also, in such event, the Energy Commission shall pay the Contractor for all satisfactory services rendered and expenses incurred within 30 days after notice of

termination which could not by reasonable efforts of the Contractor have been avoided, but not in excess of the maximum payable under this Agreement.

10. **WAIVER:**

No waiver of any breach of this Contract shall be held to be a waiver of any other or subsequent breach. All remedies afforded in this Contract shall be taken and construed as cumulative, that is, in addition to every other remedy provided therein or by law. The failure of the Energy Commission to enforce at any time any of the provisions of this Contract, or to require at any time performance by Contractor of any of the provisions, shall in no way be construed to be a waiver of those provisions, nor in any way affect the validity of this Contract or any part of it or the right of the Energy Commission to thereafter enforce each and every such provision.

11. **CAPTIONS:**

The clause headings appearing in this Agreement have been inserted for the purpose of convenience and ready reference and do not define, limit, or extend the scope or intent of the clauses.

12. **PRIOR DEALINGS, CUSTOM OR TRADE USAGE:**

In no event shall any prior course of dealing, custom or trade usage modify, alter, or supplement any of these terms.

13. **NOTICE:**

Legal notice must be given using any of the following delivery methods: U.S. Mail, overnight mail, or personal delivery, providing evidence of receipt to the person identified in Exhibit F of this Agreement for legal notices. Delivery by fax or e-mail is not considered legal notice for the purpose of this clause. This clause is not intended to apply to normal, daily communication between the parties related to progress of the work. This clause applies to situations where notice is required to be given by this Agreement or the parties are asserting their legal rights and remedies.

Notice shall be effective when received, unless a legal holiday for the State commences on the date of the attempted delivery. In which case, the effective date shall be postponed until the next business day.

14. **STOP WORK:**

The Contract Officer may, at any time, by written notice to Contractor, require Contractor to stop all or any part of the work tasks in this Agreement. Stop Work Orders may be issued for reasons such as a project exceeding budget, standard of performance, out of scope work, delay in project schedule, misrepresentations and the like.

- A. Compliance Upon receipt of such stop work order, Contractor shall immediately take all necessary steps to comply therewith and to minimize the incurrence of costs allocable to work stopped.

- B. Equitable Adjustment An equitable adjustment shall be made by Commission based upon a written request by Contractor for an equitable adjustment. Such adjustment request must be made by Contractor within thirty (30) days from the date of receipt of the stop work notice.
- C. Revoking a Stop Work Order Contractor shall resume the stopped work only upon receipt of written instructions from the Energy Commission Contract Officer canceling the stop work order.

15. **INTERPRETATION OF TERMS:**

This Agreement shall be conducted in accordance with the terms and conditions of the solicitation, if applicable. The Contractor's proposal is not attached, but is expressly incorporated by reference into this Agreement. In the event of conflict or inconsistency between the terms of this Agreement and the solicitation or proposal, this Agreement shall be considered controlling.

16. **AMENDMENTS**

This Agreement may be amended to make changes, including without limitation; additional funds, additional time, additional or modified tasks, and additional or modified terms. Amendments may be made without competitively bidding, so long as the amendment is exempt from competitive bidding pursuant to Public Contract Code section 10335, Government Code section 11010.5 and the State Contract Manual.

## **EXHIBIT E**

### **Additional Provisions**

#### **1. CONFIDENTIALITY**

##### **A. Information Considered Confidential**

If applicable, all Contractor information considered confidential at the commencement of this Agreement is designated in the Attachment to this Exhibit.

##### **B. Confidential Deliverables: Labeling and Submitting Confidential Information**

Prior to the commencement of this Agreement, if applicable, the parties have identified in the Attachment to this Exhibit, specific Confidential Information to be provided as a deliverable. All such confidential deliverables shall be marked, by the Contractor, as "Confidential" on each page of the document containing the Confidential Information and presented in a sealed package to the Commission Contracts Officer. (Non-confidential deliverables are submitted to the Accounting Office.) All Confidential Information will be contained in the "confidential" volume: no Confidential Information will be in the "public" volume.

##### **C. Submittal of Unanticipated Confidential Information as a Deliverable**

The Contractor and the Energy Commission agree that during this Agreement, it is possible that the Contractor may develop additional data or information not originally anticipated as a confidential deliverable. In this case, Contractor shall follow the procedures for a request for designation of Confidential Information specified in 20 CCR 2505. The Energy Commission's Executive Director makes the determination of confidentiality. Such subsequent determinations may be added to the list of confidential deliverables in the Attachment to this Exhibit.

##### **D. Disclosure of Confidential Information**

Disclosure of Confidential Information by the Energy Commission may only be made pursuant to 20 CCR 2506 and 2507. All confidential data, records or deliverables that are legally disclosed by the Contractor or any other entity become public records and are no longer subject to the above confidentiality designation.

2. **PROPOSAL INTERPRETATION:** This project shall be conducted in accordance with the terms and conditions of Commission Request for Proposal, number 400-07-404, titled, Technical Assistance For The Renewable Energy Program, Contractor's proposal dated January 23, 2008, and this Agreement. The Contractor's proposal is not attached, but is expressly incorporated by reference into this Agreement. In the event of conflict or inconsistency between the terms of this Agreement and the Contractor's proposal, this Agreement shall be considered controlling.
3. **WORK AUTHORIZATION PROCESS:**
- A. The Contract Manager, in conjunction with the Project Manager shall prepare Work Authorizations (WA) using the format provided by the Contract Manager. No work shall begin until the WA has been approved by the authorized individuals of the Energy Commission and the Contractor. The Contract Manager shall file each signed WA with the Commission Contract Officer before payment is approved for the WA.
- B. Each WA shall describe the objectives, scope of work, tasks, schedule and desired deliverables; all Contractor personnel and subcontractors who will conduct the work; and the budget. Each WA shall include but not be limited to:
1. Contract Number
  2. WA Number
  3. WA Title
  4. Start and End Dates for the WA
  5. Funding Source
  6. Work Statement, Schedule, Deliverables and Contact Information
  7. Detailed Budget
    - Identification of DVBE
    - Identification of Sole Source
  8. Other items as required by the Contract Manager.
- C. Payment for services is based upon an approved budget in each WA. Any expenses incurred by the Contractor that have not been identified in the WA shall be borne by the Contractor.
- D. WA amendments.
1. Amendments include but are not limited to:
    - Changes to the Work Statement,
    - Changes to the Budget
    - Changes to personnel
    - Changes to the Term
  2. Amendments require prior written approval of the authorized individuals of the Energy Commission and Contractor
  3. Amendments must be made prior to the termination date of the WA.



- E. The total cost of a completed WA shall not exceed the authorized amount. If, in the performance of the WA, the Contractor determines that the total costs will exceed the WA amount, Contractor shall immediately notify the Contract Manager. Upon such notification, the Contract Manager may:
1. Determine that no changes are warranted and authorize the Contractor to complete the work for the amount authorized and within the existing term of the WA.
  2. Amend the WA by
    - Altering the scope of the WA to accomplish the work within the authorized amount.
    - Augmenting the amount of the WA, and, if necessary, extending the term of the WA.
  3. Terminate the WA.
- F. The Energy Commission reserves the right to require the Contractor to stop or suspend work on any WA. The Contract Manager, in consultation with the Contract Officer, shall provide notice in writing to the Contractor of the date work is stopped or suspended. Costs incurred up to that date shall be reimbursed in accordance with the termination clause.
- G. Each WA shall be incorporated into this Agreement. However, it is understood and agreed by both parties that all of the terms and conditions of this Agreement shall remain in force with the inclusion of any such WA. A WA shall in no way constitute an independent Agreement, other than as provided pursuant to this Agreement, nor in any way amend or supersede any of the other provisions of this Agreement.

4. **RIGHTS OF PARTIES IN COPYRIGHTS, PHYSICAL WORKS OF ART AND FINE ART:**

The Contractor; by signing this Agreement, expressly grants to the Energy Commission for all copyrightable material, work of art and original work of authorship first produced, composed or authored in the performance of this Agreement a royalty-free, paid-up, non-exclusive, irrevocable, nontransferable, worldwide license to produce, translate, publish, use, dispose of, reproduce, prepare derivative works based on, distribute copies of, publicly perform, or publicly display a work of art or fine art, and to authorize others to produce, translate, publish, use, dispose of, reproduce, prepare derivative works based on, distribute copies of, publicly perform, or publicly display a work of art or fine art.

Contractor, by signing this Agreement, expressly conveys to the Energy Commission all ownership of the physical works of art and fine art produced

under this Agreement. Contractor agrees it does not reserve any rights to the physical works of art and fine art produced under this Agreement.

Contractor shall obtain these same rights for the Energy Commission from all subcontractors and others who produce copyrightable material, works of art, or works of fine art under this Agreement. Contractor shall incorporate these paragraphs, modified appropriately, into its agreements with subcontractors. No subcontract shall be entered into without these rights being assured to the Energy Commission from the subcontractor.

## **5. RIGHT OF PARTIES REGARDING INTELLECTUAL PROPERTY**

### **A. Right in Reports First Produced Under Agreement**

- 1) Reports produced or composed by Contractor or Subcontractors under this Agreement and specified for delivery to the Commission under this Agreement shall become the property of the Commission. The Commission may use, modify, translate, publish, reproduce, display, disseminate and dispose of these reports. The preparation of these reports by Contractor or Subcontractors shall be considered "work for hire" for copyright purposes. To the extent the preparation of reports under this Agreement is not considered work for hire under federal law, Contractor, for itself and on behalf of its Subcontractors, hereby assigns all rights and interests in said reports, including any and all copyrights and rights of reproduction to works of fine art pursuant to state law, to the Commission. Contractor shall secure the necessary assignments from its Subcontractors to effectuate the transfer of Subcontractors' rights and interests to the Commission.
- 2) Contractor may, if it wishes to do so at its own expense, publish or utilize reports produced under this Agreement in accordance with the provisions of Exhibit D.

### **B. Rights in Deliverables First Produced Under Agreement**

- 1) Deliverables, including deliverable data as defined in paragraph 7 of Exhibit D, but excluding reports, first produced or composed by Contractor or Subcontractors under this Agreement and specified for delivery to the Commission under this Agreement shall become the property of the Commission. The Commission may use, modify, translate, publish, reproduce, display, disseminate and dispose of these deliverables. The preparation of deliverables by Contractor or Subcontractors shall be considered work for hire for copyright purposes. To the extent the preparation of deliverables under this Agreement is not considered work for hire under federal law, Contractor, for itself and on behalf of its Subcontractors, hereby assigns all rights and interests in said

deliverables, including any and all copyrights and rights of reproduction to works of fine art pursuant to state law, to the Commission. Contractor shall secure the necessary assignments from its Subcontractors to effectuate the transfer of Subcontractors' rights and interests to the Commission.

- 2) The Contractor is hereby granted a license to use, modify, translate, republish, reproduce, display and disseminate any deliverables, excluding reports, first produced or composed under this Agreement for the limited purposes of furthering the activities of this Agreement and in accordance with the requirements of this Contract. In consideration for the Commission's funding under this Agreement, neither the Contractor nor any Subcontractor shall use any deliverable first produced under the Agreement, or the underlying copyrights therein, in a manner that is inconsistent with or contrary to the purpose, goals, or spirit of the activities of this Agreement.
- 3) Contractor shall place or cause to be placed the following legend on all deliverables first produced under this Agreement and specified for delivery to the Commission under this Agreement, inserting the year of creation in the blank space:

"Copyright © \_\_\_\_ [year] by the State of California. All rights reserved"

- 4) Contractor, by signing this Agreement, expressly conveys to the Commission all ownership of the physical works of art and fine art produced under this Contract pursuant to state law. Contractor agrees it does not reserve any rights to the physical works of art and fine art produced under this Agreement.

C. Deliverables and Reports Not First Produced Under Agreement

Deliverables and reports, including deliverable data as defined in paragraph 7 of Exhibit D, not first produced or composed by Contractor or Subcontractors under this Agreement, but specified for delivery to the Commission under this Agreement, may be used, modified, translated, republished, reproduced, displayed, disseminated and disposed of by the Commission under a royalty free, paid-up, nonexclusive, irrevocable, nontransferable worldwide, perpetual license secured by Contractor for and on behalf of the Commission. The Contractor shall secure this license for the Commission from the owner or owners of any copyrights in deliverables and reports not first produced or composed under this Agreement, but specified for delivery under the Agreement.

D. Software

In the event software is developed that is not a deliverable under the Agreement, and Contractor copyrights and/or patents such software, Contractor shall notify the Commission in writing of said software and grant the Commission a royalty-free, paid-up, no-cost, non-exclusive, irrevocable, nontransferable, worldwide, perpetual license to use, modify, translate, republish, reproduce, display, disseminate and dispose of the software for governmental purposes.

E. Intellectual Property Indemnification

Contractor warrants that Contractor will not, in its supplying work under this Agreement, knowingly infringe or misappropriate any intellectual property right of a third party, and that it will conduct a reasonable investigation of the intellectual property rights of third parties to avoid such infringement. Contractor will defend and indemnify Commission from and against any claim, lawsuit or other proceeding, loss, cost, liability or expense (including court costs and reasonable fees of attorneys and other professionals) arising out of any third party claim that a Contract deliverable infringes upon any patent, copyright, trade secret or other intellectual property right of any third party, or any third party claim arising out of the negligent or tortious act(s) or omission(s) of the Contractor, its employees, Subcontractors or agents, in connection with or related to the Agreement deliverables or the Contractor's performance under this Agreement.

6. **CONFLICT OF INTEREST:**

- A. Contractor agrees to continuously review new and upcoming projects in which members of the Contractor team may be involved for potential conflicts of interest. Contractor shall inform the Contract Manager as soon as a question arises about whether a potential conflict may exist. The Contract Manager and Commission's Chief Counsel's Office shall determine what constitutes a potential conflict of interest. The Energy Commission reserves the right to redirect work and funding on a project if the Commission's Chief Counsel's Office determines that there is a potential conflict of interest.
- B. The Contractor shall submit an economic interest statement (Fair Political Practices Commission's Form 700) from each employee or subcontractor whom the Energy Commission's Chief Counsel's Office, in consultation with the Contract Manager, determines is a consultant under the Political Reform Act and, thus, subject to the requirements and restrictions of the Act. Such determination will be based on the nature and duration of the work to be performed by the employee or subcontractor. The

determination as to who is a consultant under the Political Reform Act shall be requested by the Contract Manager before work by the employee or subcontractor begins. Each employee and subcontractor determined to be a consultant under the Political Reform Act shall be subject to the same disclosure category or categories applicable to the Commission staff who perform the same nature and scope of work as the consultant.

- C. No person, firm, or subsidiary thereof who has been awarded a consulting services contract may submit a bid for, nor be awarded a contract for, the provision of services, procurement of goods or supplies, or any other related action which is required, suggested, or otherwise deemed appropriate in the end product of the consulting services contract. This does not apply to any person, firm, or subsidiary thereof who is awarded a subcontract of a consulting services contract which amounts to no more than 10 percent of the total monetary value of the consulting services contract.

1) Follow-on Contracts

No person, firm, or subsidiary thereof who has been awarded a consulting services contract, or a contract which includes a consulting component, may be awarded a contract for the provision of services, delivery of goods or supplies, or any other related action which is required, suggested, or otherwise deemed appropriate as an end product of the consulting services contract. Therefore, any consultant that contracts with a state agency to develop a feasibility study or provide formal recommendations for the acquisition of EDP products or services is precluded from contracting for any work recommended in the feasibility study or the formal recommendation.





## EXHIBIT F

### NAMES AND ADDRESSES OF AGREEMENT REPRESENTATIVES

<b>Commission Contract Manager:</b>  Rachel Salazar California Energy Commission 1516 Ninth Street Sacramento, CA 95814 Phone: (916)654-5004 Fax: (916) 653-8251 e-mail: rsalazar@energy.state.ca.us	<b>Contractor Project Manager:</b>  Karin Corfee KEMA, Incorporated 492 Ninth Street, Suite 220 Oakland, CA 94607 Phone: (510) 891-0446 Fax: (510) 891-0440 e-mail: karin.corfee@us.kema.com
<b>Commission Contract Officer:</b>  Lori Tomita, MS-18 California Energy Commission 1516 Ninth Street Sacramento, CA 95814 Phone: (916) 654-5833 Fax: (916) 654-4423 e-mail: ltomita@energy.state.ca.us  Deliver confidential deliverables to this location only.	<b>Contractor Contract Officer:</b>  Nellie Tong KEMA, Incorporated 492 Ninth Street, Suite 220 Oakland, CA 94607 Phone: (510) 891-0446 Fax: (510) 891-0440 e-mail: nellie.tong@us.kema.com
<b>Invoices, Progress Reports and Non-Confidential Deliverables to:</b>  Accounting Office, MS-2 California Energy Commission 1516 Ninth Street Sacramento, CA 95814 Phone: (916) 654-4401 Fax: (916) 653-1435	
<b>Legal Notices:</b>  Cheryl Raedel, MS-18 Manager, Contracts Office California Energy Commission 1516 Ninth Street Sacramento, CA 95814 Phone: (916) 654-4392 Fax: (916) 654-4423 e-mail: craedel@energy.state.ca.us	 Gary D. Ciavola Director of Contracts and Legal Counsel KEMA, Incorporated 67 South Bedford St., Suite 201E Burlington, MA 01803 Phone: (781) 418-5749 Fax: (781) 229-4867 e-mail: gary.ciavola@kema.com

**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 10

Amendment No.

**Program Area:**

☒ Renewable Energy Program

**Contract Task:**

- ☐ Task 1 - Contract Admin/Reporting
- ☐ Task 2 - Existing Fund
- ☐ Task 3 - New Fund
- ☐ Task 4 - RPS
- ☒ Task 5 - Renewable Rebate Programs
- ☐ Task 6 - Consumer Education Fund
- ☐ Task 7 - Evaluation

**Fund Source:**

- ☒ RRTF Technical Support
- ☐ RRTF Program

**This work is authorized under: Task 5, Subtasks G,H, K, and L**

**Project Title:** Renewable Rebate Program Equipment Certification Support

**Energy Commission/Contractor Project Manager:** Payam Narvand/Karin Corfee (KEMA)

**Assigned Contractor/Subcontractor Team:**

KEMA: Karin Corfee, Nellie Tong, Pete Baumstark, Daria Mashnik, and Bill Brooks

**Term:** Effective Date through March 31, 2010

**NOTE: The Effective Date of this work authorization is the date the Energy Commission's Contract Manager signs the work authorization. The Energy Commission's Contract Manager shall be the last party to sign. No work is authorized, nor shall any work begin, until on or after the Effective Date.**

**Purpose:** The Contractors will provide support to staff on renewable rebate programs which are administered by the Energy Commission's Renewable Energy Program (REP), including the Emerging Renewable Program (ERP), New Solar Homes Partnership (NSHP), and requirements of Senate Bill 1 (SB 1) as it directly pertains to the Energy Commission. Specifically, the Contractors will: (1) review and provide feedback on draft guidebook language, (2) respond to requests for additions to the eligible equipment lists per certification requirements in the program guidebooks, (3) evaluating new technology requests for determining eligibility under the ERP requirements, and (4) providing updates to the eligible equipment lists to be posted on the Energy Commission's REP websites.

**Reason for Amendment (if this is an amendment to an existing work authorization):**

<b>TOTAL WORK AUTHORIZATION BUDGET</b>	<b>\$70,004.47</b>	<b>Cumulative (after amendments)</b>
	<b>\$</b>	<b>Incremental (\$ of amendment)</b>

**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 10

Amendment No.

**IMPORTANT NOTICE**

This Work Authorization may only authorize work that is within the scope and budget of the underlying prime contract. This Work Authorization cannot and does not authorize work that is beyond the scope of the work authorized by the underlying prime contract, may not expand the budget of the underlying prime contract, nor can this Work Authorization change, amend or modify any of the substantive terms and/or conditions of the underlying prime contract nor add any new substantive terms and/or conditions to the underlying prime contract. Expanding the scope of work or the budget of the underlying prime contract, and/or changing, modifying or amending any of the other substantive terms and conditions of the prime contract, requires a formal written contract amendment rather than a Work Authorization.

If a change in the scope or budget of the underlying prime contract is sought or required, then a formal contract amendment (rather than a Work Authorization) must be executed by the parties to the prime contract. If there is a conflict between the scope of the work set forth in this Work Authorization and the scope of work set forth in the underlying prime contract, the underlying prime contract shall prevail.

The actual costs of a completed, approved Work Authorization shall not exceed the authorized amount. If, in the performance of the work, the Contractor determines that the actual costs will exceed the estimated costs, the Contractor shall immediately notify the Energy Commission Contract Manager and Energy Commission Project Manager. Upon such notification, the Energy Commission Project Manager may (*with approval of the Energy Commission Contract Manager*):

- (1) Alter the scope of the Work Authorization to accomplish the work within estimated costs; or
- (2) Augment the Work Authorization budget; or
- (3) Authorize the Contractor to complete the work for the actual costs; or
- (4) Terminate the Work Authorization.

Any expenses incurred by the Contractor that have not been duly authorized shall be borne by the Contractor. No amendments to this Work Authorization shall be made for work undertaken without the specific approval of the Energy Commission Project Manager and Contract Manager (See Contract No. 400-07-030 for details of notice).



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 10

Amendment No.

**BUDGET FOR PRIME CONTRACTOR:**

<i><b>Staff Name</b></i>	<i><b>Loaded Hourly Rate</b></i>	<i><b>Total Estimated Hours</b></i>	<i><b>Total Labor</b></i>
See attached Budget	\$		\$
	\$		\$

<i><b>Other Direct Costs (ODC's)<sup>1</sup> (list items)</b></i>	<i><b>Cost</b></i>
See attached Budget	\$
	\$

Total Prime Contractor Labor: \$ 69,704.47

Total Prime Contractor ODC's: \$ 300.00

**(1) Total Prime Contractor Budget: \$ 70,004.47**

**BUDGET FOR SUBCONTRACTORS:**

(Please check, if applicable: ☐ DVBE)

<i><b>Individual Names by Subcontractor</b></i>	<i><b>Loaded Hourly Rate</b></i>	<i><b>Total Estimated Hours</b></i>	<i><b>Total Labor</b></i>
	\$		\$
	\$		\$

<i><b>Other Direct Costs (ODC's)<sup>1</sup> (list items)</b></i>	<i><b>Cost</b></i>
	\$

Total Subcontractor Labor: \$ 0.00

Total Subcontractor ODC's: \$ 0.00

**(2) Total Subcontractor Budget: \$ 0.00**

**TOTAL WORK AUTHORIZATION BUDGET\* \$ 70,004.47**

\*includes: (1) Prime Contractor Total and (2) Subcontractors Total

**See attached Budget Detail which is incorporated as part of this work authorization.**

<sup>1</sup> Such as shipping, reproduction, postage, telephone, and travel.

**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 10

Amendment No.

**WORK STATEMENT**

<b>Task No.</b>	<b>Title</b>	<b>Description</b>	<b>Deliverables</b>	<b>Due Date</b>
<b>1</b>	<b>Equipment Certification and Power Output Ratings</b>			
	<b>1.1 - ERP</b>	The Contractors will provide ongoing support by responding to requests for additions to the ERP's current equipment eligibility lists including: obtaining information from industry representatives; developing/updating a comprehensive list of inverters, wind turbines, fuel cells and meters, that meet the certification requirements of the current ERP guidebook, Appendix 3. For each inverter, the list will include efficiency rating, continuous rated AC power, and other physical and electrical parameters as determined by the standardized test protocol adopted by the Energy Commission. New information will be obtained from the manufacturers as available. The Contractors will modify the list based on the updated information received and will submit it electronically to the Energy Commission Project Manager not less than monthly. Staff will have these updated lists posted to the state's Go Solar California website for use by manufacturers, retailers and customers.	Revised ERP Eligible Equipment List and Certifications Listings	Due by the 25 <sup>th</sup> day of each month and as needed, as requested by Energy Commission Project Manager

**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 10

Amendment No.

	<b>1.2 – SB 1</b>	The Contractors will provide ongoing support by responding to requests for additions to the current eligibility lists including: obtaining information from industry representatives, and developing a comprehensive list of solar products consisting of inverters and meters/metering providers that meet the certification requirements for SB 1 (per the SB 1 Guidelines, CSI Handbook, and NSHP Guidebook.) For each module, the list will include module CEC-PV Calculator inputs, and other physical and electrical parameters. For each inverter, the list will include efficiency rating, continuous rated AC power, and other physical and electrical parameters as determined by the standardized test protocol adopted by the Energy Commission. New information will be obtained from the manufacturers as available. The Contractors will modify the list based on the updated information received and will submit it electronically to the Energy Commission Project Manager not less than monthly. Staff will have these updated lists posted to the state's Go Solar California website for use by manufacturers, retailers and customers.	Revised Eligible Equipment Lists and Certifications Listings	Due by the 25 <sup>th</sup> day of each month and as needed, as requested by Energy Commission Project Manager
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**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 10

Amendment No.

<b>2</b>	<b>Review of New Technology Requests</b>	Upon request and/or approval of the Energy Commission Project Manager, the Contractors will review industry representatives' requests to add products to the Eligible Equipment list that are not standard non-concentrating photovoltaic modules, meters/metering providers, inverters, fuel cells or wind turbines. The Contractors will initially determine if the information presented by the industry representative addresses all items necessary to meet the current requirements per the ERP Guidebook, Appendix 3, Section E, or SB1 Guidelines on Non-PV requirements. The Contractors will then advise the Energy Commission Project Manager on whether or not a detailed evaluation should be done. Upon approval by the Energy Commission Project Manager, the Contractors will: evaluate the technical merits of the proposal, working with the requesting party to obtain any missing information, and submit an electronic summary of the research results and recommendations to the Energy Commission Project Manager. The Energy Commission will in turn use the recommendation when deciding whether or not the new product is eligible to be added to the Eligible Equipment lists.	Written requests, updates, and evaluation summaries	As needed (e.g., when a request is received for listing a new product.) and as approved by the Energy Commission Project Manager
<b>3</b>	<b>Guidebook Support</b>	At the direction of the Energy Commission Project Manager, the Contractors will review and/or propose draft language to be included in the ERP, NSHP, and SB 1 guidebooks/guidelines, and will submit their comments and/or proposed language to the Energy Commission Project Manager for approval.	Comments and/or proposed draft language as directed.	As needed and as requested by the Energy Commission Project Manager
<b>4</b>	<b>Meetings and Discussions</b>	The Contractors will be available to participate in meetings and or discussions (e.g., conference calls, in-person, and e-mail) as needed and as requested by the Energy Commission Project Manager.	Discussions and/or e-mails	As needed and as requested by the Energy Commission Project Manager
<b>5</b>	<b>Project Management</b>	The Contractors will provide project management to ensure the project is completed on time and within budget. Additionally, the Contractor will provide progress updates for Energy Commission staff as requested or as necessary.	Progress Updates either verbal or in writing	As necessary and as requested by the Energy Commission Project Manager


**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 10

Amendment No.

Approval:

**ENERGY COMMISSION**

  
\_\_\_\_\_  
Project Manager                      09-21-09  
Date

  
\_\_\_\_\_  
Renewable Energy Program Director                      9-21-09  
Date

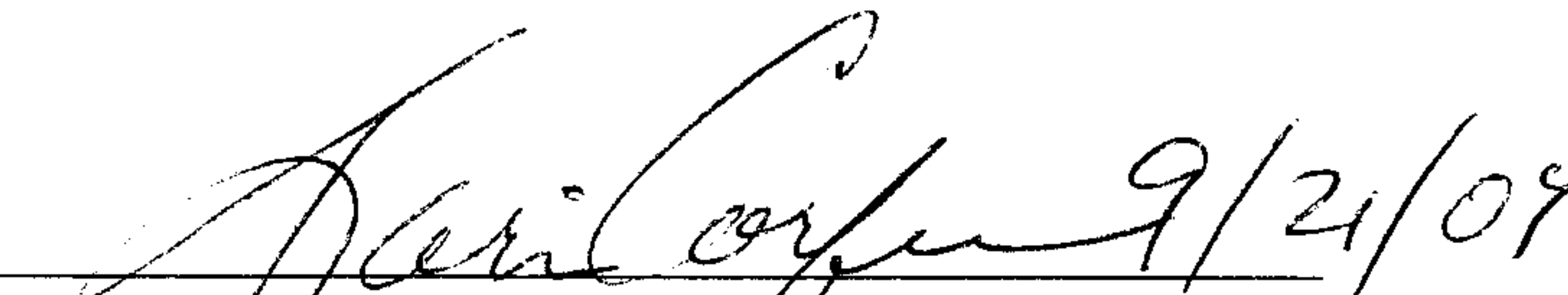
  
\_\_\_\_\_  
Contract Manager                      9/21/09  
Date

RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030

Work Authorization No. 10

Amendment No.

**KEMA, INC.**

  
Principal in Charge                      Date

**Work Authorization #10 INCREMENT**  
**Renewable Energy Equipment Certification**

Status: Draft  
Start date: 09/21/09  
End Date: 03/31/10  
Months: 6

Task Number Task Title	Total Hours	Total Expenses	KEMA				
			Karin Corfee \$234.70	Nellie Tong \$113.36	Pete Baumstark \$136.46	Daria Mashnik \$79.45	Bill Brooks \$213.13
1.1 Equipment Certification - ERP	168	\$ 23,420.75			36	72	60
1.2 Equipment Certification - SB1	300	\$ 28,965.92			90	210	
2 Review of new technology requests	36	\$ 5,030.44			24	6	6
3 Guidebook Support	30	\$ 4,860.43			20		10
4 Meetings and discussions	30	\$ 5,111.81	6	8	8		8
5 Project Management	14	\$ 2,315.12	6	8			
Total labor hours	578	\$ 69,704.47	12	16	178	288	84
Total labor expenses	check	<b>\$69,704.47</b>	\$2,816.46	\$1,813.78	\$24,289.22	\$22,882.09	\$17,902.92

<b>Direct Expenses</b>		
Miscellaneous	\$	300.00
<b>Total Direct Expenses</b>	<b>\$</b>	<b>300.00</b>

Assumptions for Task 1.2

# of months	Hrs/month	Hrs/month
6	15	35

<b>Total Estimated Costs</b>	<b>\$70,004.47</b>
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Total Prime Contractor Labor Costs	\$69,704.47	check
Total Subcontractor Labor Costs	\$0.00	
Total Small Business Labor Costs	\$0.00	
Total DVBE labor Costs	\$0.00	



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No.

**Program Area:**

☒ Renewable Energy Program

**Contract Task:**

- ☐ Task 1 – Contract Admin/Reporting
- ☐ Task 2 – Existing Fund
- ☐ Task 3 – New Fund
- ☐ Task 4 – RPS
- ☒ Task 5 – Renewable Rebate Programs
- ☐ Task 6 – Consumer Education Fund
- ☐ Task 7 – Evaluation

**Fund Source:**

- ☒ RRTF Technical Support
- ☐ RRTF Program

**This work is authorized under: Task 5, Subtasks G,H, K, and L**

**Project Title:** Renewable Rebate Program Equipment Certification Support

**Energy Commission/Contractor Project Manager:** Anthony Ng/Karin Corfee

**Assigned Contractor/Subcontractor Team:**

KEMA: Karin Corfee, Nellie Tong, Daria Mashnik, Elizabeth Steele, Chip O'Donnell, Doug Kneale, and Bill Brooks

Subcontractors: Jeff Newmiller and Tim Townsend (BEW)

**Term:** Effective Date through August 31, 2010

**NOTE: The Effective Date of this work authorization is the date the Energy Commission's Contract Manager signs the work authorization. The Energy Commission's Contract Manager shall be the last party to sign. No work is authorized, nor shall any work begin, until on or after the Effective Date.**

**Purpose:** The Contractors will provide support to staff on renewable rebate programs which are administered by the Energy Commission's Renewable Energy Program (REP), including the Emerging Renewable Program (ERP), New Solar Homes Partnership (NSHP), and requirements of Senate Bill 1 (SB 1) as it directly pertains to the Energy Commission. Specifically, the Contractors will: (1) review and provide feedback on draft guidebook language, (2) respond to requests for additions to the eligible equipment lists per certification requirements in the program guidebooks, (3) evaluating new technology requests for determining eligibility under the ERP requirements, and (4) providing updates to the eligible equipment lists to be posted on the Energy Commission's REP websites.

**Reason for Amendment (if this is an amendment to an existing work authorization):**

<b>TOTAL WORK AUTHORIZATION BUDGET</b>	<b>\$49,983.04</b>	<b>Cumulative (after amendments)</b>
	<b>\$</b>	<b>Incremental (\$ of amendment)</b>



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No.

**IMPORTANT NOTICE**

This Work Authorization may only authorize work that is within the scope and budget of the underlying prime contract. This Work Authorization cannot and does not authorize work that is beyond the scope of the work authorized by the underlying prime contract, may not expand the budget of the underlying prime contract, nor can this Work Authorization change, amend or modify any of the substantive terms and/or conditions of the underlying prime contract nor add any new substantive terms and/or conditions to the underlying prime contract. Expanding the scope of work or the budget of the underlying prime contract, and/or changing, modifying or amending any of the other substantive terms and conditions of the prime contract, requires a formal written contract amendment rather than a Work Authorization.

If a change in the scope or budget of the underlying prime contract is sought or required, then a formal contract amendment (rather than a Work Authorization) must be executed by the parties to the prime contract. If there is a conflict between the scope of the work set forth in this Work Authorization and the scope of work set forth in the underlying prime contract, the underlying prime contract shall prevail.

The actual costs of a completed, approved Work Authorization shall not exceed the authorized amount. If, in the performance of the work, the Contractor determines that the actual costs will exceed the estimated costs, the Contractor shall immediately notify the Energy Commission Contract Manager and Energy Commission Project Manager. Upon such notification, the Energy Commission Project Manager may (*with approval of the Energy Commission Contract Manager*):

- (1) Alter the scope of the Work Authorization to accomplish the work within estimated costs; or
- (2) Augment the Work Authorization budget; or
- (3) Authorize the Contractor to complete the work for the actual costs; or
- (4) Terminate the Work Authorization.

Any expenses incurred by the Contractor that have not been duly authorized shall be borne by the Contractor. No amendments to this Work Authorization shall be made for work undertaken without the specific approval of the Energy Commission Project Manager and Contract Manager (See Contract No. 400-07-030 for details of notice).



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No.

**BUDGET FOR PRIME CONTRACTOR:**

<i>Staff Name</i>	<i>Loaded Hourly Rate</i>	<i>Total Estimated Hours</i>	<i>Total Labor</i>
See attached Budget	\$		\$
	\$		\$

<i>Other Direct Costs (ODC's)<sup>1</sup> (list items)</i>	<i>Cost</i>
See attached Budget	\$
	\$

Total Prime Contractor Labor: \$ 41,983.04

Total Prime Contractor ODC's: \$ 300.00

**(1) Total Prime Contractor Budget: \$ 42,283.04**

**BUDGET FOR SUBCONTRACTORS:**

(Please check, if applicable: ☐ DVBE)

<i>Individual Names by Subcontractor</i>	<i>Loaded Hourly Rate</i>	<i>Total Estimated Hours</i>	<i>Total Labor</i>
	\$		\$
	\$		\$

<i>Other Direct Costs (ODC's)<sup>1</sup> (list items)</i>	<i>Cost</i>
	\$

Total Subcontractor Labor: \$ 7,700.00

Total Subcontractor ODC's: \$ 0.00

**(2) Total Subcontractor Budget: \$ 7,700.00**

**TOTAL WORK AUTHORIZATION BUDGET\* \$ 49,983.04**

\*includes: (1) Prime Contractor Total and (2) Subcontractors Total

**See attached Budget Detail which is incorporated as part of this work authorization.**

<sup>1</sup> Such as shipping, reproduction, postage, telephone, and travel.



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No.

**WORK STATEMENT**

<b>Task No.</b>	<b>Title</b>	<b>Description</b>	<b>Deliverables</b>	<b>Due Date</b>
<b>1</b>	<b>Equipment Certification and Power Output Ratings</b>			
	<b>1.1 - ERP</b>	The Contractors will provide ongoing support by responding to requests for additions to the ERP's current equipment eligibility lists including: obtaining information from industry representatives; developing/updating a comprehensive list of inverters, wind turbines, fuel cells and meters, that meet the certification requirements of the current ERP guidebook, Appendix 3. For each inverter, the list will include efficiency rating, continuous rated AC power, and other physical and electrical parameters as determined by the standardized test protocol adopted by the Energy Commission. New information will be obtained from the manufacturers as available. The Contractors will modify the list based on the updated information received and will submit it electronically to the Energy Commission Project Manager not less than monthly. Staff will have these updated lists posted to the state's Go Solar California website for use by manufacturers, retailers and customers.	Revised ERP Eligible Equipment List and Certifications Listings	Due by the 25 <sup>th</sup> day of each month and as needed, as requested by Energy Commission Project Manager

**RENEWABLE ENERGY PROGRAM**  
**TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No.

	<b>1.2 – SB 1</b>	<p>The Contractors will provide ongoing support by responding to requests for additions to the current eligibility lists including: obtaining information from industry representatives, and developing a comprehensive list of solar products consisting of inverters and meters/metering providers that meet the certification requirements for SB 1 (per the SB 1 Guidelines, CSI Handbook, and NSHP Guidebook.) For each module, the list will include module CEC-PV Calculator inputs, and other physical and electrical parameters. For each inverter, the list will include efficiency rating, continuous rated AC power, and other physical and electrical parameters as determined by the standardized test protocol adopted by the Energy Commission. New information will be obtained from the manufacturers as available. The Contractors will modify the list based on the updated information received and will submit it electronically to the Energy Commission Project Manager not less than monthly. Staff will have these updated lists posted to the state's Go Solar California website for use by manufacturers, retailers and customers.</p>	Revised Eligible Equipment Lists and Certifications Listings	Due by the 25 <sup>th</sup> day of each month and as needed, as requested by Energy Commission Project Manager
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**RENEWABLE ENERGY PROGRAM**  
**TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No.

2	<b>Review of New Technology Requests</b>	Upon request and/or approval of the Energy Commission Project Manager, the Contractors will review industry representatives' requests to add products to the Eligible Equipment list that are not standard non-concentrating photovoltaic modules, meters/metering providers, inverters, fuel cells or wind turbines. The Contractors will initially determine if the information presented by the industry representative addresses all items necessary to meet the current requirements per the ERP Guidebook, Appendix 3, Section E, or SB1 Guidelines on Non-PV requirements. The Contractors will then advise the Energy Commission Project Manager on whether or not a detailed evaluation should be done. Upon approval by the Energy Commission Project Manager, the Contractors will: evaluate the technical merits of the proposal, working with the requesting party to obtain any missing information, and submit an electronic summary of the research results and recommendations to the Energy Commission Project Manager. The Energy Commission will in turn use the recommendation when deciding whether or not the new product is eligible to be added to the Eligible Equipment lists.	Written requests, updates, and evaluation summaries	As needed (e.g., when a request is received for listing a new product.) and as approved by the Energy Commission Project Manager
3	<b>Guidebook Support</b>	At the direction of the Energy Commission Project Manager, the Contractors will review and/or propose draft language to be included in the ERP, NSHP, and SB 1 guidebooks/guidelines, and will submit their comments and/or proposed language to the Energy Commission Project Manager for approval.	Comments and/or proposed draft language as directed.	As needed and as requested by the Energy Commission Project Manager
4	<b>Meetings and Discussions</b>	The Contractors will be available to participate in meetings and or discussions (e.g., conference calls, in-person, and e-mail) as needed and as requested by the Energy Commission Project Manager.	Discussions and/or e-mails	As needed and as requested by the Energy Commission Project Manager
5	<b>Project Management</b>	The Contractors will provide project management to ensure the project is completed on time and within budget. Additionally, the Contractor will provide progress updates for Energy Commission staff as requested or as necessary.	Progress Updates either verbal or in writing	As necessary and as requested by the Energy Commission Project Manager



### Work Authorization #13

### Renewable Energy Equipment Certification

Status: Equipment Certification Budget

Start date: 05/17/10

End Date: 08/31/10

Months: 3

Task Number Task Title	Total Hours	Total Expenses	KEMA							BEW	
			Karin Corfee \$234.70	Nellie Tong \$113.36	Daria Mashnik \$79.45	Elizabeth Steele \$79.45	Chip O'Donnell \$234.70	Doug Kneale \$162.89	Bill Brooks \$213.13	Jeff Newmiller \$165.00	Tim Townsend \$185.00
1.1 Equipment Certification - ERP	78	\$ 10,207.55			30	18			30		
1.2 Equipment Certification - SB1	196	\$ 24,088.99			88	60			48	6	6
2 Review of new technology requests	21	\$ 7,386.61			3	6	3	3	6	12	12
3 Guidebook Support	6	\$ 1,278.78							6		
4 Meetings and discussions	34	\$ 5,798.26	2	4	12	6	3	3	4	4	4
5 Project Management	6	\$ 922.85	2	4							
Total labor hours	341	\$ 49,683.04	4	8	133	90	6	6	94	22	22
Total labor expenses	check	<b>\$49,683.04</b>	\$938.82	\$906.89	\$10,567.08	\$7,150.50	\$1,408.20	\$977.34	\$20,034.22	\$3,630.00	\$4,070.00

<b>Direct Expenses</b>		
Miscellaneous	\$	300.00
<b>Total Direct Expenses</b>	<b>\$</b>	<b>300.00</b>

#### Assumptions for Task 1.2

# of months	Hrs/month	Hrs/month	Hrs/month	Hrs/month	Hrs/month
3	30	20	16	2	2

<b>Total Estimated Costs</b>	<b>\$49,983.04</b>
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Total Prime Contractor Labor Costs	\$41,983.04	check
Total Subcontractor Labor Costs	\$7,700.00	
Total Small Business Labor Costs	\$0.00	
Total DVBE labor Costs	\$0.00	


RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030

Work Authorization No. 13


Amendment No.

Approval:

**ENERGY COMMISSION**

 5/17/10  
Project Manager Date

 5/17/10  
Renewable Energy Program Director Date

 5/17/10  
Contract Manager Date

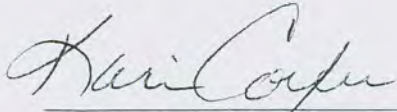


RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030

Work Authorization No. 13

Amendment No.

**KEMA, INC.**



5/17/10

Principal in Charge

Date



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 1

**Program Area:**

☒ Renewable Energy Program

**Contract Task:**

- ☐ Task 1 – Contract Admin/Reporting
- ☐ Task 2 – Existing Fund
- ☐ Task 3 – New Fund
- ☐ Task 4 – RPS
- ☒ Task 5 – Renewable Rebate Programs
- ☐ Task 6 – Consumer Education Fund
- ☐ Task 7 – Evaluation

**Fund Source:**

- ☒ RRTF Technical Support
- ☐ RRTF Program

**This work is authorized under: Task 5, Subtasks G,H, K, and L**

**Project Title:** Renewable Rebate Program Equipment Certification Support

**Energy Commission/Contractor Project Manager:** Anthony Ng/Karin Corfee

**Assigned Contractor/Subcontractor Team:**

KEMA: Karin Corfee, Nellie Tong, Daria Mashnik, Elizabeth Steele, Chip O'Donnell, Doug Kneale, and Bill Brooks

Subcontractors: Jeff Newmiller and Tim Townsend (BEW)

**Term:** Effective Date through ~~August 31, 2010~~ April 30, 2011

**NOTE: The Effective Date of this work authorization is the date the Energy Commission's Contract Manager signs the work authorization. The Energy Commission's Contract Manager shall be the last party to sign. No work is authorized, nor shall any work begin, until on or after the Effective Date.**

**Purpose:** The Contractors will provide support to staff on renewable rebate programs which are administered by the Energy Commission's Renewable Energy Program (REP), including the Emerging Renewables Program (ERP), New Solar Homes Partnership (NSHP), and requirements of Senate Bill 1 (SB 1) as it directly pertains to the Energy Commission. Specifically, the Contractors will: (1) review and provide feedback on draft guidebook language, (2) respond to requests for additions to the eligible equipment lists per certification requirements in the program guidebooks, (3) evaluating new technology requests for determining eligibility under the ERP requirements, and (4) providing updates to the eligible equipment lists to be posted on the Energy Commission's REP websites.

**Reason for Amendment (if this is an amendment to an existing work authorization):**

This Amendment extends the end-date by 8 months and increases the budget accordingly.  
No change to the scope of work.

**TOTAL WORK AUTHORIZATION BUDGET**

\$150,968.01 Cumulative (after amendments)

\$100,984.97 Incremental (\$ of amendment)



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 1

**IMPORTANT NOTICE**

This Work Authorization may only authorize work that is within the scope and budget of the underlying prime contract. This Work Authorization cannot and does not authorize work that is beyond the scope of the work authorized by the underlying prime contract, may not expand the budget of the underlying prime contract, nor can this Work Authorization change, amend or modify any of the substantive terms and/or conditions of the underlying prime contract nor add any new substantive terms and/or conditions to the underlying prime contract. Expanding the scope of work or the budget of the underlying prime contract, and/or changing, modifying or amending any of the other substantive terms and conditions of the prime contract, requires a formal written contract amendment rather than a Work Authorization.

If a change in the scope or budget of the underlying prime contract is sought or required, then a formal contract amendment (rather than a Work Authorization) must be executed by the parties to the prime contract. If there is a conflict between the scope of the work set forth in this Work Authorization and the scope of work set forth in the underlying prime contract, the underlying prime contract shall prevail.

The actual costs of a completed, approved Work Authorization shall not exceed the authorized amount. If, in the performance of the work, the Contractor determines that the actual costs will exceed the estimated costs, the Contractor shall immediately notify the Energy Commission Contract Manager and Energy Commission Project Manager. Upon such notification, the Energy Commission Project Manager may (*with approval of the Energy Commission Contract Manager*):

- (1) Alter the scope of the Work Authorization to accomplish the work within estimated costs; or
- (2) Augment the Work Authorization budget; or
- (3) Authorize the Contractor to complete the work for the actual costs; or
- (4) Terminate the Work Authorization.

Any expenses incurred by the Contractor that have not been duly authorized shall be borne by the Contractor. No amendments to this Work Authorization shall be made for work undertaken without the specific approval of the Energy Commission Project Manager and Contract Manager (See Contract No. 400-07-030 for details of notice).



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 1

**BUDGET FOR PRIME CONTRACTOR:**

<i>Staff Name</i>	<i>Loaded Hourly Rate</i>	<i>Total Estimated Hours</i>	<i>Total Labor</i>
See attached Budget	\$		\$
	\$		\$

<i>Other Direct Costs (ODC's)<sup>1</sup> (list items)</i>	<i>Cost</i>
See attached Budget	\$
	\$

Total Prime Contractor Labor: \$ 142,968.01

Total Prime Contractor ODC's: \$ 300.00

**(1) Total Prime Contractor Budget: \$ 143,968.01**

**BUDGET FOR SUBCONTRACTORS:**

(Please check, if applicable: ☐ DVBE)

<i>Individual Names by Subcontractor</i>	<i>Loaded Hourly Rate</i>	<i>Total Estimated Hours</i>	<i>Total Labor</i>
	\$		\$
	\$		\$

<i>Other Direct Costs (ODC's)<sup>1</sup> (list items)</i>	<i>Cost</i>
	\$

Total Subcontractor Labor: \$ 7,700.00

Total Subcontractor ODC's: \$ 0.00

**(2) Total Subcontractor Budget: \$ 7,700.00**

**TOTAL WORK AUTHORIZATION BUDGET\* \$150,968.01**

\*includes: (1) Prime Contractor Total and (2) Subcontractors Total

**See attached Budget Detail which is incorporated as part of this work authorization.**

<sup>1</sup> Such as shipping, reproduction, postage, telephone, and travel.

**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 1

**WORK STATEMENT**

<b>Task No.</b>	<b>Title</b>	<b>Description</b>	<b>Deliverables</b>	<b>Due Date</b>
<b>1</b>	<b>Equipment Certification and Power Output Ratings</b>			
	<b>1.1 - ERP</b>	The Contractors will provide ongoing support by responding to requests for additions to the ERP's current equipment eligibility lists including: obtaining information from industry representatives; developing/updating a comprehensive list of inverters, wind turbines, fuel cells and meters, that meet the certification requirements of the current ERP guidebook, Appendix 3. For each inverter, the list will include efficiency rating, continuous rated AC power, and other physical and electrical parameters as determined by the standardized test protocol adopted by the Energy Commission. New information will be obtained from the manufacturers as available. The Contractors will modify the list based on the updated information received and will submit it electronically to the Energy Commission Project Manager not less than monthly. Staff will have these updated lists posted to the state's Go Solar California website for use by manufacturers, retailers and customers.	Revised ERP Eligible Equipment List and Certifications Listings	Due by the 25 <sup>th</sup> day of each month and as needed, as requested by Energy Commission Project Manager



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 1

	<b>1.2 – SB 1</b>	<p>The Contractors will provide ongoing support by responding to requests for additions to the current eligibility lists including: obtaining information from industry representatives, and developing a comprehensive list of solar products consisting of inverters and meters/metering providers that meet the certification requirements for SB 1 (per the SB 1 Guidelines, CSI Handbook, and NSHP Guidebook.) For each module, the list will include module CEC-PV Calculator inputs, and other physical and electrical parameters. For each inverter, the list will include efficiency rating, continuous rated AC power, and other physical and electrical parameters as determined by the standardized test protocol adopted by the Energy Commission. New information will be obtained from the manufacturers as available. The Contractors will modify the list based on the updated information received and will submit it electronically to the Energy Commission Project Manager not less than monthly. Staff will have these updated lists posted to the state's Go Solar California website for use by manufacturers, retailers and customers.</p>	Revised Eligible Equipment Lists and Certifications Listings	Due by the 25 <sup>th</sup> day of each month and as needed, as requested by Energy Commission Project Manager
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**RENEWABLE ENERGY PROGRAM**  
**TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 1

2	<b>Review of New Technology Requests</b>	Upon request and/or approval of the Energy Commission Project Manager, the Contractors will review industry representatives' requests to add products to the Eligible Equipment list that are not standard non-concentrating photovoltaic modules, meters/metering providers, inverters, fuel cells or wind turbines. The Contractors will initially determine if the information presented by the industry representative addresses all items necessary to meet the current requirements per the ERP Guidebook, Appendix 3, Section E, or SB1 Guidelines on Non-PV requirements. The Contractors will then advise the Energy Commission Project Manager on whether or not a detailed evaluation should be done. Upon approval by the Energy Commission Project Manager, the Contractors will: evaluate the technical merits of the proposal, working with the requesting party to obtain any missing information, and submit an electronic summary of the research results and recommendations to the Energy Commission Project Manager. The Energy Commission will in turn use the recommendation when deciding whether or not the new product is eligible to be added to the Eligible Equipment lists.	Written requests, updates, and evaluation summaries	As needed (e.g., when a request is received for listing a new product.) and as approved by the Energy Commission Project Manager
3	<b>Guidebook Support</b>	At the direction of the Energy Commission Project Manager, the Contractors will review and/or propose draft language to be included in the ERP, NSHP, and SB 1 guidebooks/guidelines, and will submit their comments and/or proposed language to the Energy Commission Project Manager for approval.	Comments and/or proposed draft language as directed.	As needed and as requested by the Energy Commission Project Manager
4	<b>Meetings and Discussions</b>	The Contractors will be available to participate in meetings and or discussions (e.g., conference calls, in-person, and e-mail) as needed and as requested by the Energy Commission Project Manager.	Discussions and/or e-mails	As needed and as requested by the Energy Commission Project Manager
5	<b>Project Management</b>	The Contractors will provide project management to ensure the project is completed on time and within budget. Additionally, the Contractor will provide progress updates for Energy Commission staff as requested or as necessary.	Progress Updates either verbal or in writing	As necessary and as requested by the Energy Commission Project Manager

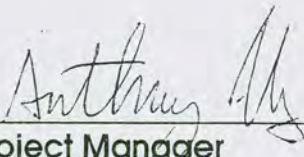
RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030

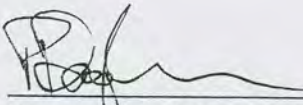
| Work Authorization No. 13

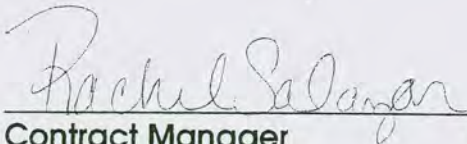
Amendment No. 1

Approval:

**ENERGY COMMISSION**

  
Project Manager      8/25/10  
Date

  
Renewable Energy Program Director      8-25-10  
Date

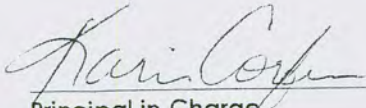
  
Contract Manager      Date

RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030

Work Authorization No. 13

Amendment No. 1

**KEMA, INC.**

 8/25/10  
Principal in Charge      Date



# Work Authorization #13 Amendment 1

## Renewable Energy Equipment Certification

Status: Equipment Certification Budget

Start date: effective date

End Date: 04/30/11

Months: 11 5

Task Number	Task Title	Total Hours	Total Expenses	KEMA						BEW		
				Karin Corfee	Nellie Tong	Daria Mashnik	Elizabeth Steele	Chip O'Donnell	Doug Kneale	Bill Brooks	Jeff Newmiller	Tim Townsend
				\$234.70	\$113.36	\$79.45	\$79.45	\$234.70	\$162.89	\$213.13	\$165.00	\$185.00
1.1	Equipment Certification - ERP	276	\$ 37,969.85	-	-	30	126	-	-	120	-	-
1.2	Equipment Certification - SB1	772	\$ 86,695.87	-	-	88	510	-	-	174	6	6
2	Review of new technology requests	48	\$ 11,601.67	-	-	3	18	6	3	18	12	12
3	Guidebook Support	18	\$ 3,836.34	-	-	-	-	-	-	18	-	-
4	Meetings and discussions	59	\$ 9,187.99	2	8	12	18	6	3	10	4	4
5	Project Management	10	\$ 1,376.30	2	8	-	-	-	-	-	-	-
Total labor hours		1,183	\$ 150,668.01	4	16	133	672	12	6	340	22	22
Total labor expenses		check	\$150,668.01	\$938.82	\$1,813.78	\$10,567.08	\$53,390.40	\$2,816.40	\$977.34	\$72,464.20	\$3,630.00	\$4,070.00

Assumptions for Task 1.2

Direct Expenses	# of months	Hrs/month	Hrs/month	Hrs/month	Hrs/month
Miscellaneous	3	30	20	16	2
Total Direct Expenses					

Total Estimated Costs	\$ 300.00
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Total Prime Contractor Labor Costs	\$ 300.00
Total Subcontractor Labor Costs	check
Total Small Business Labor Costs	\$7,700.00
Total DVBE labor Costs	\$0.00

Amendment 1 incremental budget	\$100,984.97
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**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 2

**Program Area:**

☒ Renewable Energy Program

**Contract Task:**

- ☐ Task 1 – Contract Admin/Reporting
- ☐ Task 2 – Existing Fund
- ☐ Task 3 – New Fund
- ☐ Task 4 – RPS
- ☒ Task 5 – Renewable Rebate Programs
- ☐ Task 6 – Consumer Education Fund
- ☐ Task 7 – Evaluation

**Fund Source:**

- ☒ RRTF Technical Support
- ☐ RRTF Program

**This work is authorized under: Task 5, Subtasks G,H, K, and L**

**Project Title:** Renewable Rebate Program Equipment Certification Support

**Energy Commission/Contractor Project Manager:** Anthony Ng/Karin Corfee

**Assigned Contractor/Subcontractor Team:**

KEMA: Karin Corfee, Nellie Tong, Daria Mashnik, Elizabeth Steele, Chip O'Donnell, Doug Kneale, and Bill Brooks

Subcontractors: Jeff Newmiller and Tim Townsend (BEW)

**Term:** Effective Date through ~~April 30, 2011~~ April 30, 2012

**NOTE:** The Effective Date of this work authorization is the date the Energy Commission's Contract Manager signs the work authorization. The Energy Commission's Contract Manager shall be the last party to sign. No work is authorized, nor shall any work begin, until on or after the Effective Date.

**Purpose:** The Contractors will provide support to staff on renewable rebate programs which are administered by the Energy Commission's Renewable Energy Program (REP), including the Emerging Renewables Program (ERP), New Solar Homes Partnership (NSHP), and requirements of Senate Bill 1 (SB 1) as it directly pertains to the Energy Commission. Specifically, the Contractors will: (1) review and provide feedback on draft guidebook language, (2) respond to requests for additions to the eligible equipment lists per certification requirements in the program guidebooks, (3) evaluating new technology requests for determining eligibility under the ERP requirements, and (4) providing updates to the eligible equipment lists to be posted on the Energy Commission's REP websites.

**Reason for Amendment (if this is an amendment to an existing work authorization):**

This Amendment 1 extends the end-date by 8 months from August 31, 2010 to April 30, 2011 and increases the budget accordingly. No change to the scope of work.

Amendment 2 extends the end date from April 30, 2011 to April 30, 2012. No change in budget or scope of work.

<b>TOTAL WORK AUTHORIZATION BUDGET</b>	<b><u>\$150,968.01</u> Cumulative (after amendments)</b>
	<b><u>\$100,984.97</u> Incremental (\$ of amendment)</b>



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 2

**IMPORTANT NOTICE**

This Work Authorization may only authorize work that is within the scope and budget of the underlying prime contract. This Work Authorization cannot and does not authorize work that is beyond the scope of the work authorized by the underlying prime contract, may not expand the budget of the underlying prime contract, nor can this Work Authorization change, amend or modify any of the substantive terms and/or conditions of the underlying prime contract nor add any new substantive terms and/or conditions to the underlying prime contract. Expanding the scope of work or the budget of the underlying prime contract, and/or changing, modifying or amending any of the other substantive terms and conditions of the prime contract, requires a formal written contract amendment rather than a Work Authorization.

If a change in the scope or budget of the underlying prime contract is sought or required, then a formal contract amendment (rather than a Work Authorization) must be executed by the parties to the prime contract. If there is a conflict between the scope of the work set forth in this Work Authorization and the scope of work set forth in the underlying prime contract, the underlying prime contract shall prevail.

The actual costs of a completed, approved Work Authorization shall not exceed the authorized amount. If, in the performance of the work, the Contractor determines that the actual costs will exceed the estimated costs, the Contractor shall immediately notify the Energy Commission Contract Manager and Energy Commission Project Manager. Upon such notification, the Energy Commission Project Manager may *(with approval of the Energy Commission Contract Manager)*:

- (1) Alter the scope of the Work Authorization to accomplish the work within estimated costs; or
- (2) Augment the Work Authorization budget; or
- (3) Authorize the Contractor to complete the work for the actual costs; or
- (4) Terminate the Work Authorization.

Any expenses incurred by the Contractor that have not been duly authorized shall be borne by the Contractor. No amendments to this Work Authorization shall be made for work undertaken without the specific approval of the Energy Commission Project Manager and Contract Manager (See Contract No. 400-07-030 for details of notice).



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 2

**BUDGET FOR PRIME CONTRACTOR:**

<i>Staff Name</i>	<i>Loaded Hourly Rate</i>	<i>Total Estimated Hours</i>	<i>Total Labor</i>
See attached Budget	\$		\$
	\$		\$

<i>Other Direct Costs (ODC's)<sup>1</sup> (list items)</i>	<i>Cost</i>
See attached Budget	\$
	\$

Total Prime Contractor Labor: \$ 142,968.01

Total Prime Contractor ODC's: \$ 300.00

**(1) Total Prime Contractor Budget: \$ 143,968.01**

**BUDGET FOR SUBCONTRACTORS:**

(Please check, if applicable: ☐ DVBE)

<i>Individual Names by Subcontractor</i>	<i>Loaded Hourly Rate</i>	<i>Total Estimated Hours</i>	<i>Total Labor</i>
	\$		\$
	\$		\$

<i>Other Direct Costs (ODC's)<sup>1</sup> (list items)</i>	<i>Cost</i>
	\$

Total Subcontractor Labor: \$ 7,700.00

Total Subcontractor ODC's: \$ 0.00

**(2) Total Subcontractor Budget: \$ 7,700.00**

**TOTAL WORK AUTHORIZATION BUDGET\* \$150,968.01**

\*includes: (1) Prime Contractor Total and (2) Subcontractors Total

**See attached Budget Detail which is incorporated as part of this work authorization.**

<sup>1</sup> Such as shipping, reproduction, postage, telephone, and travel.

**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 2

**WORK STATEMENT**

<b>Task No.</b>	<b>Title</b>	<b>Description</b>	<b>Deliverables</b>	<b>Due Date</b>
<b>1</b>	<b>Equipment Certification and Power Output Ratings</b>			
	<b>1.1 - ERP</b>	The Contractors will provide ongoing support by responding to requests for additions to the ERP's current equipment eligibility lists including: obtaining information from industry representatives; developing/updating a comprehensive list of inverters, wind turbines, fuel cells and meters, that meet the certification requirements of the current ERP guidebook, Appendix 3. For each inverter, the list will include efficiency rating, continuous rated AC power, and other physical and electrical parameters as determined by the standardized test protocol adopted by the Energy Commission. New information will be obtained from the manufacturers as available. The Contractors will modify the list based on the updated information received and will submit it electronically to the Energy Commission Project Manager not less than monthly. Staff will have these updated lists posted to the state's Go Solar California website for use by manufacturers, retailers and customers.	Revised ERP Eligible Equipment List and Certifications Listings	Due by the 25 <sup>th</sup> day of each month and as needed, as requested by Energy Commission Project Manager



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 2

	<b>1.2 – SB 1</b>	<p>The Contractors will provide ongoing support by responding to requests for additions to the current eligibility lists including: obtaining information from industry representatives, and developing a comprehensive list of solar products consisting of inverters and meters/metering providers that meet the certification requirements for SB 1 (per the SB 1 Guidelines, CSI Handbook, and NSHP Guidebook.) For each module, the list will include module CEC-PV Calculator inputs, and other physical and electrical parameters. For each inverter, the list will include efficiency rating, continuous rated AC power, and other physical and electrical parameters as determined by the standardized test protocol adopted by the Energy Commission. New information will be obtained from the manufacturers as available. The Contractors will modify the list based on the updated information received and will submit it electronically to the Energy Commission Project Manager not less than monthly. Staff will have these updated lists posted to the state's Go Solar California website for use by manufacturers, retailers and customers.</p>	Revised Eligible Equipment Lists and Certifications Listings	Due by the 25 <sup>th</sup> day of each month and as needed, as requested by Energy Commission Project Manager
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**RENEWABLE ENERGY PROGRAM**  
**TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 2

2	<b>Review of New Technology Requests</b>	Upon request and/or approval of the Energy Commission Project Manager, the Contractors will review industry representatives' requests to add products to the Eligible Equipment list that are not standard non-concentrating photovoltaic modules, meters/metering providers, inverters, fuel cells or wind turbines. The Contractors will initially determine if the information presented by the industry representative addresses all items necessary to meet the current requirements per the ERP Guidebook, Appendix 3, Section E, or SB1 Guidelines on Non-PV requirements. The Contractors will then advise the Energy Commission Project Manager on whether or not a detailed evaluation should be done. Upon approval by the Energy Commission Project Manager, the Contractors will: evaluate the technical merits of the proposal, working with the requesting party to obtain any missing information, and submit an electronic summary of the research results and recommendations to the Energy Commission Project Manager. The Energy Commission will in turn use the recommendation when deciding whether or not the new product is eligible to be added to the Eligible Equipment lists.	Written requests, updates, and evaluation summaries	As needed (e.g., when a request is received for listing a new product.) and as approved by the Energy Commission Project Manager
3	<b>Guidebook Support</b>	At the direction of the Energy Commission Project Manager, the Contractors will review and/or propose draft language to be included in the ERP, NSHP, and SB 1 guidebooks/guidelines, and will submit their comments and/or proposed language to the Energy Commission Project Manager for approval.	Comments and/or proposed draft language as directed.	As needed and as requested by the Energy Commission Project Manager
4	<b>Meetings and Discussions</b>	The Contractors will be available to participate in meetings and or discussions (e.g., conference calls, in-person, and e-mail) as needed and as requested by the Energy Commission Project Manager.	Discussions and/or e-mails	As needed and as requested by the Energy Commission Project Manager

**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 2

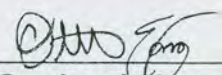
5	<b>Project Management</b>	The Contractors will provide project management to ensure the project is completed on time and within budget. Additionally, the Contractor will provide progress updates for Energy Commission staff as requested or as necessary.	Progress Updates either verbal or in writing	As necessary and as requested by the Energy Commission Project Manager
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Approval:

**ENERGY COMMISSION**

  
\_\_\_\_\_  
Project Manager                      4/28/11  
Date

  
\_\_\_\_\_  
Renewable Energy Program Director                      4/28/2011  
Date

  
\_\_\_\_\_  
Contract Manager                      4/28/11  
Date



RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030

Work Authorization No. 13

Amendment No. 2

**KEMA, INC.**

*Kevin Carpe* 4/25/11  
Principal in Charge Date

**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 3

**Program Area:**

☒ Renewable Energy Program

**Contract Task:**

☐ Task 1 – Contract Admin/Reporting

☐ Task 2 – Existing Fund

☐ Task 3 – New Fund

☐ Task 4 – RPS

☒ Task 5 – Renewable Rebate Programs

☐ Task 6 – Consumer Education Fund

☐ Task 7 – Evaluation

**Fund Source:**

☒ RRTF Technical Support

☐ RRTF Program

**This work is authorized under: Task 5, Subtasks G,H, K, and L**

**Project Title:** Renewable Rebate Program Equipment Certification Support

**Energy Commission/Contractor Project Manager:** Anthony Ng/Karin Corfee

**Assigned Contractor/Subcontractor Team:**

KEMA: Karin Corfee, Nellie Tong, Daria Mashnik, Elizabeth Steele, Chip O'Donnell, Doug Kneale, Bill Brooks, and Rob Kamisky

Subcontractors: Jeff Newmiller and Tim Townsend (BEW)

**Term:** Effective Date (May 17, 2010) through April 30, 2012

**NOTE: The Effective Date of this work authorization is the date the Energy Commission's Contract Manager signs the work authorization. The Energy Commission's Contract Manager shall be the last party to sign. No work is authorized, nor shall any work begin, until on or after the Effective Date.**

**Purpose:** The Contractors will provide support to staff on renewable rebate programs which are administered by the Energy Commission's Renewable Energy Program (REP), including the Emerging Renewables Program (ERP), New Solar Homes Partnership (NSHP), and requirements of Senate Bill 1 (SB 1) as it directly pertains to the Energy Commission. Specifically, the Contractors will: (1) review and provide feedback on draft guidebook language, (2) respond to requests for additions to the eligible equipment lists per certification requirements in the program guidebooks, (3) evaluating new technology requests for determining eligibility under the ERP requirements, and (4) providing updates to the eligible equipment lists to be posted on the Energy Commission's REP websites.

**Reason for Amendment (if this is an amendment to an existing work authorization):**

**Amendment 1 extends the end-date by 8 months from August 31, 2010 to April 30, 2011 and increases the budget accordingly. No change to the scope of work.**

**Amendment 2 extends the end date from April 30, 2011 to April 30, 2012. No change in budget or scope of work.**

**Amendment 3 adds Task 1.3 into this WA and increases the budget accordingly.**



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 3

<b>TOTAL WORK AUTHORIZATION BUDGET</b>	<b>\$ <u>176,101.41</u> Cumulative (after amendments)</b>
	<b>\$ <u>25,133.40</u> Incremental (\$ of amendment)</b>

**IMPORTANT NOTICE**

This Work Authorization may only authorize work that is within the scope and budget of the underlying prime contract. This Work Authorization cannot and does not authorize work that is beyond the scope of the work authorized by the underlying prime contract, may not expand the budget of the underlying prime contract, nor can this Work Authorization change, amend or modify any of the substantive terms and/or conditions of the underlying prime contract nor add any new substantive terms and/or conditions to the underlying prime contract. Expanding the scope of work or the budget of the underlying prime contract, and/or changing, modifying or amending any of the other substantive terms and conditions of the prime contract, requires a formal written contract amendment rather than a Work Authorization.

If a change in the scope or budget of the underlying prime contract is sought or required, then a formal contract amendment (rather than a Work Authorization) must be executed by the parties to the prime contract. If there is a conflict between the scope of the work set forth in this Work Authorization and the scope of work set forth in the underlying prime contract, the underlying prime contract shall prevail.

The actual costs of a completed, approved Work Authorization shall not exceed the authorized amount. If, in the performance of the work, the Contractor determines that the actual costs will exceed the estimated costs, the Contractor shall immediately notify the Energy Commission Contract Manager and Energy Commission Project Manager. Upon such notification, the Energy Commission Project Manager may *(with approval of the Energy Commission Contract Manager)*:

- (1) Alter the scope of the Work Authorization to accomplish the work within estimated costs; or
- (2) Augment the Work Authorization budget; or
- (3) Authorize the Contractor to complete the work for the actual costs; or
- (4) Terminate the Work Authorization.

Any expenses incurred by the Contractor that have not been duly authorized shall be borne by the Contractor. No amendments to this Work Authorization shall be made for work undertaken without the specific approval of the Energy Commission Project Manager and Contract Manager (See Contract No. 400-07-030 for details of notice).



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 3

**BUDGET FOR PRIME CONTRACTOR:**

<i>Staff Name</i>	<i>Loaded Hourly Rate</i>	<i>Total Estimated Hours</i>	<i>Total Labor</i>
See attached Budget	\$		\$
	\$		\$

<i>Other Direct Costs (ODC's)<sup>1</sup> (list items)</i>	<i>Cost</i>
See attached Budget	\$
	\$

Total Prime Contractor Labor: \$ 168,101.41

Total Prime Contractor ODC's: \$ 300.00

(1) Total Prime Contractor Budget: \$ 168,401.41

**BUDGET FOR SUBCONTRACTORS:**

(Please check, if applicable: ☐ DVBE)

<i>Individual Names by Subcontractor</i>	<i>Loaded Hourly Rate</i>	<i>Total Estimated Hours</i>	<i>Total Labor</i>
	\$		\$
	\$		\$

<i>Other Direct Costs (ODC's)<sup>1</sup> (list items)</i>	<i>Cost</i>
	\$

Total Subcontractor Labor: \$ 7,700.00

Total Subcontractor ODC's: \$ 0.00

(2) Total Subcontractor Budget: \$ 7,700.00

TOTAL WORK AUTHORIZATION BUDGET\* \$ 176,101.41

\*includes: (1) Prime Contractor Total and (2) Subcontractors Total

See attached Budget Detail which is incorporated as part of this work authorization.

<sup>1</sup> Such as shipping, reproduction, postage, telephone, and travel.



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 3

**WORK STATEMENT**

Task No.	Title	Description	Deliverables	Due Date
1	<b>Equipment Certification and Power Output Ratings</b>			
	1.1 - ERP	The Contractors will provide ongoing support by responding to requests for additions to the ERP's current equipment eligibility lists including: obtaining information from industry representatives; developing/updating a comprehensive list of inverters, wind turbines, fuel cells and meters, that meet the certification requirements of the current ERP guidebook, Appendix 3. For each inverter, the list will include efficiency rating, continuous rated AC power, and other physical and electrical parameters as determined by the standardized test protocol adopted by the Energy Commission. New information will be obtained from the manufacturers as available. The Contractors will modify the list based on the updated information received and will submit it electronically to the Energy Commission Project Manager not less than monthly. Staff will have these updated lists posted to the state's Go Solar California website for use by manufacturers, retailers and customers.	Revised ERP Eligible Equipment List and Certifications Listings	Due by the 25 <sup>th</sup> day of each month and as needed, as requested by Energy Commission Project Manager

**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 3

	<b>1.2 – SB 1</b>	<p>The Contractors will provide ongoing support by responding to requests for additions to the current eligibility lists including: obtaining information from industry representatives, and developing a comprehensive list of solar products consisting of inverters and meters/metering providers that meet the certification requirements for SB 1 (per the SB 1 Guidelines, CSI Handbook, and NSHP Guidebook.) For each module, the list will include module CEC-PV Calculator inputs, and other physical and electrical parameters. For each inverter, the list will include efficiency rating, continuous rated AC power, and other physical and electrical parameters as determined by the standardized test protocol adopted by the Energy Commission. New information will be obtained from the manufacturers as available. The Contractors will modify the list based on the updated information received and will submit it electronically to the Energy Commission Project Manager not less than monthly. Staff will have these updated lists posted to the state's Go Solar California website for use by manufacturers, retailers and customers.</p>	Revised Eligible Equipment Lists and Certifications Listings	Due by the 25 <sup>th</sup> day of each month and as needed, as requested by Energy Commission Project Manager
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**RENEWABLE ENERGY PROGRAM**  
**TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 3

<p><b><u>1.3</u></b></p>	<p><b><u>Technical Evaluation of Equipment Performance</u></b></p>	<p><u>At the direction of the Energy Commission Project Manager, the Contractors will conduct a technical evaluation of the data and/or information provided to KEMA and/or the Energy Commission for the purposes of adding specific equipment to the Energy Commission's list of eligible equipment under the ERP and SB1. The Energy Commission Project Manager will identify specific data and/or information for the Contractors to evaluate. The evaluations should seek to determine whether the data and/or information submitted to KEMA and/or the Energy Commission for specific equipment by equipment manufacturers and/or retailers support the claims of performance, power output, capacity, and/or operational characteristics made by the manufacturers and/or retailers for the specific equipment.</u></p>	<p><b><u>Evaluation Report</u></b></p>	<p><u>As needed and as approved by the Energy Commission Project Manager</u></p>
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**RENEWABLE ENERGY PROGRAM**  
**TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 3

2	<b>Review of New Technology Requests</b>	Upon request and/or approval of the Energy Commission Project Manager, the Contractors will review industry representatives' requests to add products to the Eligible Equipment list that are not standard non-concentrating photovoltaic modules, meters/metering providers, inverters, fuel cells or wind turbines. The Contractors will initially determine if the information presented by the industry representative addresses all items necessary to meet the current requirements per the ERP Guidebook, Appendix 3, Section E, or SB1 Guidelines on Non-PV requirements. The Contractors will then advise the Energy Commission Project Manager on whether or not a detailed evaluation should be done. Upon approval by the Energy Commission Project Manager, the Contractors will: evaluate the technical merits of the proposal, working with the requesting party to obtain any missing information, and submit an electronic summary of the research results and recommendations to the Energy Commission Project Manager. The Energy Commission will in turn use the recommendation when deciding whether or not the new product is eligible to be added to the Eligible Equipment lists.	Written requests, updates, and evaluation summaries	As needed (e.g., when a request is received for listing a new product.) and as approved by the Energy Commission Project Manager
3	<b>Guidebook Support</b>	At the direction of the Energy Commission Project Manager, the Contractors will review and/or propose draft language to be included in the ERP, NSHP, and SB 1 guidebooks/guidelines, and will submit their comments and/or proposed language to the Energy Commission Project Manager for approval.	Comments and/or proposed draft language as directed.	As needed and as requested by the Energy Commission Project Manager
4	<b>Meetings and Discussions</b>	The Contractors will be available to participate in meetings and or discussions (e.g., conference calls, in-person, and e-mail) as needed and as requested by the Energy Commission Project Manager.	Discussions and/or e-mails	As needed and as requested by the Energy Commission Project Manager
5	<b>Project Management</b>	The Contractors will provide project management to ensure the project is completed on time and within budget. Additionally, the Contractor will provide progress updates for Energy Commission staff as requested or as necessary.	Progress Updates either verbal or in writing	As necessary and as requested by the Energy Commission Project Manager



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 3

**KEMA, INC.**

*Kiri Cooper*

**Principal in Charge**

**5/25/11**

**Date**

<p><b>2</b></p> <p><b>Technology Support</b></p>	<p>The Contractor will provide technical assistance to the Energy Commission staff in the form of on-site visits, phone consultations, and email support. The Contractor will also provide technical assistance to the Energy Commission staff in the form of on-site visits, phone consultations, and email support. The Contractor will also provide technical assistance to the Energy Commission staff in the form of on-site visits, phone consultations, and email support.</p>	<p><b>1</b></p> <p><b>Project Management</b></p>
<p><b>3</b></p> <p><b>Guidance and Support</b></p>	<p>The Contractor will provide guidance and support to the Energy Commission staff in the form of on-site visits, phone consultations, and email support. The Contractor will also provide guidance and support to the Energy Commission staff in the form of on-site visits, phone consultations, and email support.</p>	<p><b>2</b></p> <p><b>Project Management</b></p>
<p><b>4</b></p> <p><b>Meetings and Discussions</b></p>	<p>The Contractor will provide meetings and discussions to the Energy Commission staff in the form of on-site visits, phone consultations, and email support. The Contractor will also provide meetings and discussions to the Energy Commission staff in the form of on-site visits, phone consultations, and email support.</p>	<p><b>3</b></p> <p><b>Project Management</b></p>
<p><b>5</b></p> <p><b>Project Management</b></p>	<p>The Contractor will provide project management to the Energy Commission staff in the form of on-site visits, phone consultations, and email support. The Contractor will also provide project management to the Energy Commission staff in the form of on-site visits, phone consultations, and email support.</p>	<p><b>4</b></p> <p><b>Project Management</b></p>

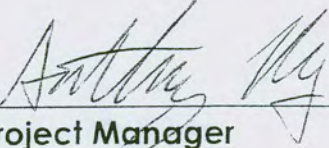
RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030

Work Authorization No. 13

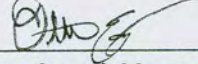
Amendment No. 3

Approval:

**ENERGY COMMISSION**

  
\_\_\_\_\_  
Project Manager      5/26/11  
Date

  
\_\_\_\_\_  
Renewable Energy Program Director      5/26/11  
Date

  
\_\_\_\_\_  
Contract Manager      5/26/11  
Date



**Work Authorization #13 Amendment 3**  
**Renewable Energy Equipment Certification**

Status: Equipment Certification Budget

Start date: effective date

End Date: 04/30/12

Months: 23.5

Task Number	Task Title	Total Hours	Total Expenses	KEMA								BEW	
				Karin Corfee \$234.70	Nellie Tong \$113.36	Daria Mashnik \$79.45	Elizabeth Steele \$79.45	Chip O'Donnell \$234.70	Doug Kneale \$162.89	Rob Kaminsky \$195.00	Bill Brooks \$213.13	Jeff Newmiller \$165.00	Tim Townsend \$185.00
1.1	Equipment Certification - ERP	276	\$ 37,969.85	-	-	30	126	-	-		120	-	-
1.2	Equipment Certification - SB1 Technical Evaluation of Equipment	772	\$ 86,695.87	-	-	88	510	-	-		174	6	6
1.3	Performance												
a.	Review 4 existing standards (California, other states, AWEA)	36	\$ 6,557.80				4			32			
b.	Review 3 sets of sample data	44	\$ 8,117.80				4			40			
c.	Summary report including recommendations	44	\$ 8,117.80				4			40			
2	Review of new technology requests	48	\$ 11,601.67	-	-	3	18	6	3		18	12	12
3	Guidebook Support	26	\$ 5,396.34	-	-	-	-	-	-	8	18	-	-
4	Meetings and discussions	63	\$ 9,967.99	2	8	12	18	6	3	4	10	4	4
5	Project Management	10	\$ 1,376.30	2	8	-	-	-	-		-	-	-
Total labor hours		1,319	\$ 175,801.41	4	16	133	684	12	6	124	340	22	22
Total labor expenses		check	\$175,801.41	\$938.82	\$1,813.78	\$10,567.08	\$54,343.80	\$2,816.40	\$977.34	\$24,180.00	\$72,464.20	\$3,630.00	\$4,070.00

<b>Direct Expenses</b>	
Miscellaneous	\$ 300.00
<b>Total Direct Expenses</b>	<b>\$ 300.00</b>

Assumptions for Task 1.2

# of months	Hrs/month	Hrs/month	Hrs/month	Hrs/month	Hrs/month
3	30	20		16	2

<b>Total Estimated Costs</b>	<b>\$176,101.41</b>
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Total Prime Contractor Labor Costs	\$168,101.41	check
Total Subcontractor Labor Costs	\$7,700.00	
Total Small Business Labor Costs	\$0.00	
Total DVBE labor Costs	\$0.00	

Amendment 1 incremental budget	\$100,984.97
Amendment 2 incremental budget	\$0.00
Amendment 3 incremental budget	\$25,133.40

**Work Authorization #13 Amendment 1**  
**Renewable Energy Equipment Certification**

Status: Equipment Certification Budget

Start date: effective date

End Date: 04/30/12

Months: 23.5

Task Number    Task Title		Total Hours    Total Expenses		KEMA							BEW	
				Karin Corfee	Nellie Tong	Daria Mashnik	Elizabeth Steele	Chip O'Donnell	Doug Kneale	Bill Brooks	Jeff Newmiller	Tim Townsend
				\$234.70	\$113.36	\$79.45	\$79.45	\$234.70	\$162.89	\$213.13	\$165.00	\$185.00
1.1	Equipment Certification - ERP	276	\$ 37,969.85	-	-	30	126	-	-	120	-	-
1.2	Equipment Certification - SB1	772	\$ 86,695.87	-	-	88	510	-	-	174	6	6
2	Review of new technology requests	48	\$ 11,601.67	-	-	3	18	6	3	18	12	12
3	Guidebook Support	18	\$ 3,836.34	-	-	-	-	-	-	18	-	-
4	Meetings and discussions	59	\$ 9,187.99	2	8	12	18	6	3	10	4	4
5	Project Management	10	\$ 1,376.30	2	8	-	-	-	-	-	-	-
Total labor hours		1,183	\$ 150,668.01	4	16	133	672	12	6	340	22	22
Total labor expenses		check	\$150,668.01	\$938.82	\$1,813.78	\$10,567.08	\$53,390.40	\$2,816.40	\$977.34	\$72,464.20	\$3,630.00	\$4,070.00

**Assumptions for Task 1.2**

Direct Expenses		# of months	Hrs/month	Hrs/month	Hrs/month	Hrs/month	Hrs/month	Hrs/month
Miscellaneous	\$ 300.00	3	30	20		16	2	2

**Total Direct Expenses** \$ 300.00

**Total Estimated Costs** \$150,968.01

Total Prime Contractor Labor Costs	\$142,968.01	check
Total Subcontractor Labor Costs	\$7,700.00	
Total Small Business Labor Costs	\$0.00	
Total DVBE labor Costs	\$0.00	

Amendment 1 incremental budget \$100,984.97



**Work Authorization #13 Amendment 1**  
**Renewable Energy Equipment Certification**

Status: Equipment Certification Budget

Start date: effective date

End Date: 04/30/11

Months: 9

Task Number    Task Title		Total Hours    Total Expenses		KEMA						BEW		
				Karin Corfee \$234.70	Nellie Tong \$113.36	Daria Mashnik \$79.45	Elizabeth Steele \$79.45	Chip O'Donnell \$234.70	Doug Kneale \$162.89	Bill Brooks \$213.13	Jeff Newmiller \$165.00	Tim Townsend \$185.00
1.1	Equipment Certification - ERP	198	\$ 27,762.30				108			90		
1.2	Equipment Certification - SB1	576	\$ 62,606.88				450			126		
2	Review of new technology requests	27	\$ 4,215.06				12	3		12		
3	Guidebook Support	12	\$ 2,557.56							12		
4	Meetings and discussions	25	\$ 3,389.72		4		12	3		6		
5	Project Management	4	\$ 453.44		4							
Total labor hours		842	\$ 100,984.97	-	8	-	582	6	-	246	-	-
Total labor expenses		check	\$100,984.97	\$0.00	\$906.89	\$0.00	\$46,239.90	\$1,408.20	\$0.00	\$52,429.98	\$0.00	\$0.00

Assumptions for Task 1.2

Direct Expenses		# of months	Hrs/month	Hrs/month	Hrs/month	Hrs/month
Miscellaneous	\$ -	9	50	14	2	2
<b>Total Direct Expenses</b>	<b>\$ -</b>					

**Total Estimated Costs \$100,984.97**

Total Prime Contractor Labor Costs	\$100,984.97	check
Total Subcontractor Labor Costs	\$0.00	
Total Small Business Labor Costs	\$0.00	
Total DVBE labor Costs	\$0.00	

# Work Authorization #13

## Renewable Energy Equipment Certification

Status: Equipment Certification Budget

Start date: 05/17/10

End Date: 08/31/10

Months: 3

Task Number	Task Title	Total Hours	Total Expenses	KEMA							BEW	
				Karin Corfee \$234.70	Nellie Tong \$113.36	Daria Mashnik \$79.45	Elizabeth Steele \$79.45	Chip O'Donnell \$234.70	Doug Kneale \$162.89	Bill Brooks \$213.13	Jeff Newmiller \$165.00	Tim Townsend \$185.00
1.1	Equipment Certification - ERP	78	\$ 10,207.55			30	18			30		
1.2	Equipment Certification - SB1	196	\$ 24,088.99			88	60			48	6	6
2	Review of new technology requests	21	\$ 7,386.61			3	6	3	3	6	12	12
3	Guidebook Support	6	\$ 1,278.78							6		
4	Meetings and discussions	34	\$ 5,798.26			12	6	3	3	4	4	4
5	Project Management	6	\$ 922.85	2	4							
				2	4							
Total labor hours		341	\$ 49,683.04	4	8	133	90	6	6	94	22	22
Total labor expenses		check	\$49,683.04	\$938.82	\$906.89	\$10,567.08	\$7,150.50	\$1,408.20	\$977.34	\$20,034.22	\$3,630.00	\$4,070.00

### Assumptions for Task 1.2

Direct Expenses		
Miscellaneous	\$	300.00
Total Direct Expenses	\$	300.00

# of months	Hrs/month	Hrs/month	Hrs/month	Hrs/month	Hrs/month
3	30	20		16	2

Total Estimated Costs	\$49,983.04
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Total Prime Contractor Labor Costs	\$41,983.04	check
Total Subcontractor Labor Costs	\$7,700.00	
Total Small Business Labor Costs	\$0.00	
Total DVBE labor Costs	\$0.00	





**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 4

**Program Area:**

☒ Renewable Energy Program

**Contract Task:**

- ☐ Task 1 – Contract Admin/Reporting
- ☐ Task 2 – Existing Fund
- ☐ Task 3 – New Fund
- ☐ Task 4 – RPS
- ☒ Task 5 – Renewable Rebate Programs
- ☐ Task 6 – Consumer Education Fund
- ☐ Task 7 – Evaluation

**Fund Source:**

- ☒ RRTF Technical Support
- ☐ RRTF Program

**This work is authorized under: Task 5, Subtasks G,H, K, and L**

**Project Title:** Renewable Rebate Program Equipment Certification Support

**Energy Commission/Contractor Project Manager:** Anthony Ng/Karin Corfee

**Assigned Contractor/Subcontractor Team:**

KEMA: Karin Corfee, Nellie Tong, Daria Mashnik, Elizabeth Steele, Chip O'Donnell, Doug Kneale, Bill Brooks, and Rob Kamisky

Subcontractors: Jeff Newmiller and Tim Townsend (BEW)

**Term:** Effective Date (May 17, 2010)through April 30, 2012

**NOTE: The Effective Date of this work authorization is the date the Energy Commission's Contract Manager signs the work authorization. The Energy Commission's Contract Manager shall be the last party to sign. No work is authorized, nor shall any work begin, until on or after the Effective Date.**

**Purpose:** The Contractors will provide support to staff on renewable rebate programs which are administered by the Energy Commission's Renewable Energy Program (REP), including the Emerging Renewables Program (ERP), New Solar Homes Partnership (NSHP), and requirements of Senate Bill 1 (SB 1) as it directly pertains to the Energy Commission. Specifically, the Contractors will: (1) review and provide feedback on draft guidebook language, (2) respond to requests for additions to the eligible equipment lists per certification requirements in the program guidebooks, (3) evaluating new technology requests for determining eligibility under the ERP requirements, and (4) providing updates to the eligible equipment lists to be posted on the Energy Commission's REP websites.

**Reason for Amendment (if this is an amendment to an existing work authorization):**

**Amendment 1 extends the end-date by 8 months from August 31, 2010 to April 30, 2011 and increases the budget accordingly. No change to the scope of work.**

**Amendment 2 extends the end date from April 30, 2011 to April 30, 2012. No change in budget or scope of work.**

**Amendment 3 adds Task 1.3 into this WA and increases the budget accordingly.**



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 4

**Amendment 4 increases the budget by \$24,080.17 for an additional analysis of 10 small wind turbines to be completed under Task 1.3.**

<b>TOTAL WORK AUTHORIZATION BUDGET</b>	<b>\$ 200,181.58 Cumulative (after amendments)</b>
	<b>\$ 24,080.17 Incremental (\$ of amendment)</b>

**IMPORTANT NOTICE**

This Work Authorization may only authorize work that is within the scope and budget of the underlying prime contract. This Work Authorization cannot and does not authorize work that is beyond the scope of the work authorized by the underlying prime contract, may not expand the budget of the underlying prime contract, nor can this Work Authorization change, amend or modify any of the substantive terms and/or conditions of the underlying prime contract nor add any new substantive terms and/or conditions to the underlying prime contract. Expanding the scope of work or the budget of the underlying prime contract, and/or changing, modifying or amending any of the other substantive terms and conditions of the prime contract, requires a formal written contract amendment rather than a Work Authorization.

If a change in the scope or budget of the underlying prime contract is sought or required, then a formal contract amendment (rather than a Work Authorization) must be executed by the parties to the prime contract. If there is a conflict between the scope of the work set forth in this Work Authorization and the scope of work set forth in the underlying prime contract, the underlying prime contract shall prevail.

The actual costs of a completed, approved Work Authorization shall not exceed the authorized amount. If, in the performance of the work, the Contractor determines that the actual costs will exceed the estimated costs, the Contractor shall immediately notify the Energy Commission Contract Manager and Energy Commission Project Manager. Upon such notification, the Energy Commission Project Manager may *(with approval of the Energy Commission Contract Manager)*:

- (1) Alter the scope of the Work Authorization to accomplish the work within estimated costs; or
- (2) Augment the Work Authorization budget; or
- (3) Authorize the Contractor to complete the work for the actual costs; or
- (4) Terminate the Work Authorization.

Any expenses incurred by the Contractor that have not been duly authorized shall be borne by the Contractor. No amendments to this Work Authorization shall be made for work undertaken without the specific approval of the Energy Commission Project Manager and Contract Manager (See Contract No. 400-07-030 for details of notice).



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 4

**BUDGET FOR PRIME CONTRACTOR:**

<i>Staff Name</i>	<i>Loaded Hourly Rate</i>	<i>Total Estimated Hours</i>	<i>Total Labor</i>
See attached Budget	\$		\$
	\$		\$

<i>Other Direct Costs (ODC's)<sup>1</sup> (list items)</i>	<i>Cost</i>
See attached Budget	\$
	\$

Total Prime Contractor Labor: \$ 192,181.58

Total Prime Contractor ODC's: \$ 300.00

**(1) Total Prime Contractor Budget: \$ 192,181.58**

**BUDGET FOR SUBCONTRACTORS:**

(Please check, if applicable: ☐ DVBE)

<i>Individual Names by Subcontractor</i>	<i>Loaded Hourly Rate</i>	<i>Total Estimated Hours</i>	<i>Total Labor</i>
	\$		\$
	\$		\$

<i>Other Direct Costs (ODC's)<sup>1</sup> (list items)</i>	<i>Cost</i>
	\$

Total Subcontractor Labor: \$ 7,700.00

Total Subcontractor ODC's: \$ 0.00

**(2) Total Subcontractor Budget: \$ 7,700.00**

**TOTAL WORK AUTHORIZATION BUDGET\* \$200,181.58**

\*includes: (1) Prime Contractor Total and (2) Subcontractors Total

**See attached Budget Detail which is incorporated as part of this work authorization.**

<sup>1</sup> Such as shipping, reproduction, postage, telephone, and travel.



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 4

**WORK STATEMENT**

Task No.	Title	Description	Deliverables	Due Date
1	<b>Equipment Certification and Power Output Ratings</b>			
	<b>1.1 - ERP</b>	The Contractors will provide ongoing support by responding to requests for additions to the ERP's current equipment eligibility lists including: obtaining information from industry representatives; developing/updating a comprehensive list of inverters, wind turbines, fuel cells and meters, that meet the certification requirements of the current ERP guidebook, Appendix 3. For each inverter, the list will include efficiency rating, continuous rated AC power, and other physical and electrical parameters as determined by the standardized test protocol adopted by the Energy Commission. New information will be obtained from the manufacturers as available. The Contractors will modify the list based on the updated information received and will submit it electronically to the Energy Commission Project Manager not less than monthly. Staff will have these updated lists posted to the state's Go Solar California website for use by manufacturers, retailers and customers.	Revised ERP Eligible Equipment List and Certifications Listings	Due by the 25 <sup>th</sup> day of each month and as needed, as requested by Energy Commission Project Manager

**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 4

	<b>1.2 – SB 1</b>	<p>The Contractors will provide ongoing support by responding to requests for additions to the current eligibility lists including: obtaining information from industry representatives, and developing a comprehensive list of solar products consisting of inverters and meters/metering providers that meet the certification requirements for SB 1 (per the SB 1 Guidelines, CSI Handbook, and NSHP Guidebook.) For each module, the list will include module CEC-PV Calculator inputs, and other physical and electrical parameters. For each inverter, the list will include efficiency rating, continuous rated AC power, and other physical and electrical parameters as determined by the standardized test protocol adopted by the Energy Commission. New information will be obtained from the manufacturers as available. The Contractors will modify the list based on the updated information received and will submit it electronically to the Energy Commission Project Manager not less than monthly. Staff will have these updated lists posted to the state's Go Solar California website for use by manufacturers, retailers and customers.</p>	Revised Eligible Equipment Lists and Certifications Listings	Due by the 25 <sup>th</sup> day of each month and as needed, as requested by Energy Commission Project Manager
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**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 4

1.3	<b>Technical Evaluation of Equipment Performance</b>	At the direction of the Energy Commission Project Manager, the Contractors will conduct a technical evaluation of the data and/or information provided to KEMA and/or the Energy Commission for the purposes of adding specific equipment to the Energy Commission's list of eligible equipment under the ERP and SB1. The Energy Commission Project Manager will identify specific data and/or information for the Contractors to evaluate. The evaluations should seek to determine whether the data and/or information submitted to KEMA and/or the Energy Commission for specific equipment by equipment manufacturers and/or retailers support the claims of performance, power output, capacity, and/or operational characteristics made by the manufacturers and/or retailers for the specific equipment.	Evaluation Report	As needed and as approved by the Energy Commission Project Manager
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**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 4

2	<b>Review of New Technology Requests</b>	Upon request and/or approval of the Energy Commission Project Manager, the Contractors will review industry representatives' requests to add products to the Eligible Equipment list that are not standard non-concentrating photovoltaic modules, meters/metering providers, inverters, fuel cells or wind turbines. The Contractors will initially determine if the information presented by the industry representative addresses all items necessary to meet the current requirements per the ERP Guidebook, Appendix 3, Section E, or SB1 Guidelines on Non-PV requirements. The Contractors will then advise the Energy Commission Project Manager on whether or not a detailed evaluation should be done. Upon approval by the Energy Commission Project Manager, the Contractors will: evaluate the technical merits of the proposal, working with the requesting party to obtain any missing information, and submit an electronic summary of the research results and recommendations to the Energy Commission Project Manager. The Energy Commission will in turn use the recommendation when deciding whether or not the new product is eligible to be added to the Eligible Equipment lists.	Written requests, updates, and evaluation summaries	As needed (e.g., when a request is received for listing a new product.) and as approved by the Energy Commission Project Manager
3	<b>Guidebook Support</b>	At the direction of the Energy Commission Project Manager, the Contractors will review and/or propose draft language to be included in the ERP, NSHP, and SB 1 guidebooks/guidelines, and will submit their comments and/or proposed language to the Energy Commission Project Manager for approval.	Comments and/or proposed draft language as directed.	As needed and as requested by the Energy Commission Project Manager
4	<b>Meetings and Discussions</b>	The Contractors will be available to participate in meetings and or discussions (e.g., conference calls, in-person, and e-mail) as needed and as requested by the Energy Commission Project Manager.	Discussions and/or e-mails	As needed and as requested by the Energy Commission Project Manager



**RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030**

Work Authorization No. 13

Amendment No. 4

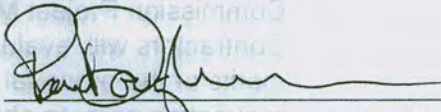
<b>5 Project Management</b>	The Contractors will provide project management to ensure the project is completed on time and within budget. Additionally, the Contractor will provide progress updates for Energy Commission staff as requested or as necessary.	Progress Updates either verbal or in writing	As necessary and as requested by the Energy Commission Project Manager
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Approval:

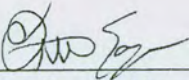
**ENERGY COMMISSION**

  
Project Manager

7/15/11  
Date

  
Renewable Energy Program Director

7/15/11  
Date

  
Contract Manager

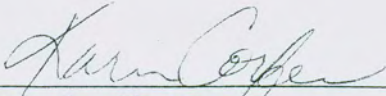
7/15/11  
Date

RENEWABLE ENERGY PROGRAM  
TECHNICAL ASSISTANCE CONTRACT NO. 400-07-030

Work Authorization No. 13

Amendment No. 4

**KEMA, INC.**

  
Principal in Charge

7/14/11  
Date



**Work Authorization #13 Amendment 4**  
**Renewable Energy Equipment Certification**

Status: Equipment Certification Budget

Start date: effective date

End Date: 04/30/12

Months: 23.5

Additional turbines

10

Task Number	Task Title	Total Hours	Total Expenses	KEMA								BEW	
				Karin Corfee \$234.70	Nellie Tong \$113.36	Daria Mashnik \$79.45	Elizabeth Steele \$79.45	Chip O'Donnell \$234.70	Doug Kneale \$162.89	Rob Kaminsky \$195.00	Bill Brooks \$213.13	Jeff Newmiller \$165.00	Tim Townsend \$185.00
1.1	Equipment Certification - ERP	276	\$ 37,969.85	-	-	30	126	-	-	-	120	-	-
1.2	Equipment Certification - SB1	772	\$ 86,695.87	-	-	88	510	-	-	-	174	6	6
1.3	Performance												
a.	Review 4 existing standards (California, other states, AWEA)	36	\$ 6,557.80				4			32			
b.	Review 13 sets of sample data	124	\$ 23,717.80				4			120			
c.	Summary report including recommendations	90	\$ 16,597.97		6		4			80			
2	Review of new technology requests	48	\$ 11,601.67	-	-	3	18	6	3		18	12	12
3	Guidebook Support	26	\$ 5,396.34	-	-	-	-	-	-	8	18	-	-
4	Meetings and discussions	63	\$ 9,967.99	2	8	12	18	6	3	4	10	4	4
5	Project Management	10	\$ 1,376.30	2	8	-	-	-	-	-	-	-	-
Total labor hours		1,445	\$ 199,881.58	4	22	133	684	12	6	244	340	22	22
Total labor expenses		check	\$199,881.58	\$938.82	\$2,493.94	\$10,567.08	\$54,343.80	\$2,816.40	\$977.34	\$47,580.00	\$72,464.20	\$3,630.00	\$4,070.00

Assumptions for Task 1.2

Direct Expenses		# of months	Hrs/month	Hrs/month	Hrs/month	Hrs/month	Hrs/month
Miscellaneous	\$ 300.00	3	30	20		16	2

**Total Direct Expenses** \$ 300.00

**Total Estimated Costs** \$200,181.58

Total Prime Contractor Labor Costs	\$192,181.58	check
Total Subcontractor Labor Costs	\$7,700.00	
Total Small Business Labor Costs	\$0.00	
Total DVBE labor Costs	\$0.00	

Amendment 1 incremental budget	\$100,984.97
Amendment 2 incremental budget	\$0.00
Amendment 3 incremental budget	\$25,133.40
Amendment 4 incremental budget	\$24,080.17

**From:** <rick@dyocore.com>  
**To:** "Mashnik, Daria" <Daria.Mashnik@US.KEMA.com>  
**CC:** <dave@dyocore.com>  
**Date:** 5/26/2010 7:18 AM  
**Subject:** Re: power curve output data for SolAir - 1.6 kW  
**Attachments:** image006.jpg; image007.jpg; image005.png; IEC\_Standard\_61400[1].doc

Daria, kindly find requested data attached, Rick

SolAir - IEC standard 61400-12-1  
DyoCore  
March 1<sup>st</sup>, 2010

## Abstract

In 2006 DyoCore, a California manufacturing company began development of its small wind/solar hybrid turbine – SolAir™. Over the past few years DyoCore has collected information that relates to power performance, power quality, noise, safety and function, and endurance tests that meet or exceed the standards established by the DOE's National Renewable Energy Laboratory (NREL) established in 2008 and now part of the International Electro technical Commission (IEC) standards. These results are being provided to state and federal agencies for their consideration in allowing SolAir as an eligible alternative energy product for state incentives.

The following reports the results of SolAir actual on location installed testing to date, and puts the test results in perspective for the average consumer. Other topics addressed include independent testing results, and a discussion of SolAir's support resources.

## Introduction

The basis for DyoCore's presented data was established at the National Renewable Energy Laboratory to help reduce the barriers of wind energy expansion and qualify SolAir under the IEC Standard 61400.

Among these barriers is a lack of independent testing resources for small turbines and guidelines for their manufacturers. Testing results established by the NREL provide turbine manufacturers with a portion of the requirements for turbine certification and use. Turbines that meet these guidelines give consumers confidence in small turbine technology and will separate reliable turbines from those that do not perform as advertised.

Figure 1 shows the SolAir installed in San Marcos, CA. and Hampshire IL, Power performance, duration, noise, and safety and function tests were performed on both turbines presented herein. Power quality testing was performed only on single-phase applications. The available preliminary results of those tests to date are presented below and are subject to change.

	Install Date	Data Hours	cut in wind		cut out		hub height	site AEP	Avg annual wind sp m/s
			sp m/s	m/s	wind sp m/s				
San Marcos, CA	16-Sep-08	12062	2.1	16.7	27'		1674.7	2.9	
Hampshire, IL	13-Jan-09	9744	2	17.1	22'		2293.3	6.3	





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Contact: David Raine

Domestic and international distribution  
Turbines also available direct from factory

DyoCore

Model	SolAir
Orientation	Downwind
Rated Output	1.6 kW
Output Voltage (V)	130v @ 800 rpm
Applications	Stand Alone (combined wind/solar DC output), Grid Connection, Direct Heating, and Pumping
Controller Type	Ginlong
Overspeed Protection	Osculates mechanically in high winds for auto speed control
Blade Material	Aluminum
# of Blades	3
Rotor Diameter (m)	1.2
Swept Area (m <sup>2</sup> )	1.13
Windspeed (m/s)	
Rated	8
Cut-in	2
Cut-out	16.5
Survival	54 - known
Head Weight (kg)	20
Tower Type	Surface mount
Tower Height (m)	1.4m - 58"
Product Life (years)	15
Warranty (years)	10
Units sold	450
Years on the market	0.5
Price (USD)	MSRP: \$1700 SolAir 800 hybrid wind/solar turbine. Includes turbine, rectifier, and surface mounting hardware.
Additional Info	SolAir is a dynamic hybrid vertical mill that combines wind/solar integrated into a single balanced frame/fin design. SolAir is designed so versatile it can be mounted on any flat horizontal, vertical or pitched surface and can be either bolted or ballasted down.

### The SolAir wind/solar Hybrid Generator

DyoCore's SolAir in San Marcos CA was installed on September 16th, 2008. It combines is a 120 VAC, single-phase, grid-connected, permanent-magnet generator wind turbine rated at 1.6 kW and a 36 VDC Solar panel rated at 30 W. SolAir is a horizontal-axis turbine mounted on a flat roof surface, and has a rotor height of 59" above the mounted surface and a rotor area of 54". The Second SolAir unit was installed on September 28<sup>th</sup>, 2008 in Hampshire IL. At the time of this publication IEC Standard 61400 data collection for duration, safety and function, power performance testing and power quality and acoustic noise testing was complete.



SolAir, Hampshire IL



SolAir San Marcos CA

### Duration Testing

The duration test is conducted according to section 9.4 of the IEC Standard 61400-2: Design Requirements for Small Wind Turbines. Duration testing provides information about the turbine's structural integrity, quality of environmental protection, and dynamic behavior. The test requires a minimum of 6 months of operation, 2,500 hours of power production in winds of any velocity, 250 hours of power production in winds of 1.2 Vave and greater, and 25 hours of power production in wind of 1.8 Vave and greater. Section 6.2 of IEC Standard 61400-2 defines Vave, which depends on the small wind turbine class as identified by the manufacturer and based on the wind speeds in which the turbine was designed to operate. The turbine must not experience any major failures during the test period and must achieve an operational time fraction of 90% or greater. The operational time fraction is defined by the following.

$$O = \frac{T_T - T_N - T_U - T_E}{T_T - T_N - T_E} \times 100\%$$

Where TT is the total test time, TN is the time attributed to turbine faults and manufacturer-mandated inspections and maintenance, TU is the time during which the turbine status is unknown due to lost data or data-acquisition failure and maintenance, and TE is the time that is excluded from analysis due to grid faults and laboratory-mandated inspections or stops.

Part of the reliable-operation requirement for the duration test includes no significant wear, corrosion, or damage to turbine components. The structural integrity and material degradation are investigated through inspections of the turbine before, during, and after the testing period. Blades, welds, and other turbine components were visually inspected and photographed before the test and any apparent abnormalities

documented. After the required test data is collected, the turbine is lowered and disassembled for inspection of all individual components. Routine inspections of both units during the tests have not revealed any abnormalities. Post-test inspections for the units presented have not occurred.

Duration testing on both units are still in progress. The turbines have experienced minimal and normal operational problems and none of which resulted in complete failure or termination of the testing. Both SolAir units tested were in original condition without modification at the term of the presented testing results. Problems and/or noted downtime that occurred included wrapping of the wires at the base of the unit at the IL location which required manual untwisting, test equipment failure and replacement at the CA location, and movement of unit in CA to a new location for the placement of the online live Camera.

Table 1. Preliminary Duration Results for the San Marcos CA SolAir Install

Month	Wind	Solar	Hours of production at or above							Wind / Solar Average - limits				T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	Q
	kWh production	kWh production	0	5	10	12	>12	Max Wind	Average Wind	Max Gusts	Average Gusts	Hours					%	
Sep-08	52.60786205	6.431632	171	109	29	35	12	0	18.4	6.3	N	N	350	72	20	24	91%	
Oct-08	195.3149042	14.791154	342	282	50	66	21	3	20.7	5.8	N	N	744	0	10	8	99%	
Nov-08	128.782932	14.15983	341	279	46	36	16	8	25.3	5.3	N	N	720	0	0	16	98%	
Dec-08	192.5889154	12.697478	274	326	58	48	18	22	36.8	5.3	N	N	744	0	0	0	100%	
Jan-09	94.00400394	13.345624	344	317	42	32	7	2	18.4	5.8	N	N	744	110	5	48	92%	
Feb-09	218.5929992	13.552332	259	251	52	60	28	22	38	7.3	N	N	672	0	0	0	100%	
Mar-09	251.255455	14.882604	270	276	54	90	43	11	24.2	7.4	N	N	744	6	0	48	93%	
Apr-09	340.6171748	14.950184	185	273	73	112	45	32	29.9	7.2	N	N	720	0	0	24	97%	
May-09	226.7815714	14.604234	246	291	67	113	27	0	19.6	7	N	N	744	0	2	24	97%	
Jun-09	296.5248076	15.705282	184	300	67	99	61	9	23	7.2	N	N	720	0	1	0	100%	
Jul-09	230.5729028	17.39069	287	234	79	120	34	0	18.4	7.1	N	N	744	0	0	24	97%	
Aug-09	218.7784195	19.286376	300	245	63	106	30	0	17.3	5.8	N	N	744	0	0	0	100%	
Sep-09	182.7617497	17.642534	319	240	46	92	23	0	21.9	6.3		24	720	56	48	86	86%	
Oct-09	212.153999	18.10679	283	269	59	71	26	16	26.5	6		27	744	0	0	0	100%	
Nov-09	124.3978237	16.808882	343	273	43	42	13	6	26.5	5.8		26	720	1	0	0	100%	
Dec-09	200.9828667	15.042874	289	312	39	54	28	22	42.6	6.7		39	744	0	3	0	100%	
* Jan-10	233.7411242	13.852388	329	274	38	47	15	41	41.4	7.8		43	744	4	36	96	86%	
Annual - 09	2597.4	191.3	3309.0	3301.0	664.0	993.0	355.0	120.0	25.5	6.6		29.0	730.0	14.4	4.9	21.2	97%	

Hours of Power Production for San Marcos CA:

Table 1 shows the preliminary duration results for the San Marcos SolAir installation. The turbine accumulated 12,062 hours of total run time with an operational time fraction of 97%.

The low operational time fraction for January of 2009 was caused by the failure of testing equipment, Data Logger failed and had to be replaced. Investigations suggest that high output amps caused the logger to fail. The Aemc L261 Data Logger was used to log voltage utilizing two 10 k Voltage dividers combined with an inspeed anemometer and WindWare software.

Since the replacement of the Aemc L261 Data Logger with the Hobo U-30 Data Logger, the turbine has run with a high operational time fraction. The majority of the other time classified as TN during the test is attributed to recording equipment time faults, and general maintenance whereas often the generator during excessively high winds/gusts would create amps that would burn out the 10k resistors. In September 2009 both units were removed to replace the bronze bearings with sealed casted bearings. Both turbines have run without vibration, mechanical errors or operational modifications since September 2009 through the end of the testing data period.

Table 2. Preliminary Duration Results for the Hampshire IL SolAir Install

Month	Wind	Solar	Hours of production at or above						Wind / Gust Average - limits				T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	O
	kWh production	kWh production	0	6	8	10	12	>12	Max Wind	Average Wind	Max Gusts	Average Gusts	Hours					%
Jan-09	82.80788208	4.894652	N	N	N	N	N	N	N	N	N	N	350	0	32	2	99%	
Feb-09	195.3345042	12.722152	0	9	0	18	79	638	48	16.8	N	N	744	0	0	1	100%	
Mar-09	128.782932	12.786694	1	35	0	40	89	555	53.8	16.7	N	N	720	0	0	0	100%	
Apr-09	192.5889154	13.336386	7	10	0	27	80	620	59.5	19.1	N	N	744	0	0	6	99%	
May-09	94.00400394	12.508624	0	27	0	25	97	595	56.1	16.7	N	N	744	0	0	3	100%	
Jun-09	218.5929992	12.999974	0	28	0	39	90	515	60.7	14.8	N	N	672	0	0	0	100%	
Jul-09	251.2555455	13.623136	1	53	0	66	184	440	48	13.7	N	N	744	0	0	0	100%	
Aug-09	340.6171748	13.84832	0	59	0	69	185	407	41.1	13.1	N	N	720	0	0	0	100%	
Sep-09	226.7815714	13.284678	0	103	0	87	199	355	36.5	11.9	N	N	744	0	0	16	98%	
Oct-09	296.5248076	13.225654	0	84	0	65	174	397	50.3	13.3	N	N	720	0	0	0	100%	
Nov-09	230.5729028	16.680728	0	23	0	29	126	566	48	15.4		24	20	744	0	24	0	100%
Dec-09	218.7764195	15.512214	0	34	0	19	127	564	44.6	15.7		24	20	744	0	0	0	100%
Jan-10	182.7617497	15.84875	10	30	0	37	102	541	40	18.1		24	20	720	0	0	0	100%
Feb-10	212.153999	10.798912	0	46	0	46	104	438	44.6	15.6		27	21	634	0	0	0	100%
Totals:	2659.4	171.3	19.0	495.0	0.0	521.0	1532.0	6193.0	47.0	14.8		24.8	20.3	9744.0	0.0	2.4	1.9	99%

#### Hours of Power Production for Hampshire IL:

Table 2. shows the duration results for the SolAir installed in Hampshire IL. This unit has accumulated 9,744 hours of total run time with an operational time fraction of 99%.

The low operational time fraction that occurred in September 2009 was a result of changing out the turbine's bearing from bronze to sealed casted bearings. The majority of the remaining time classified as TN during the test is attributed to the wire being twisted up at the base of the unit requiring manual untwisting. This has been solved for current production models with a free swivel joint connection that allows the wires to turn freely 360°. Wind metering equipment that extended data being recorded from simply wind speeds to include gusts was added in November 2009, this was accompanied by an inspection of the voltage metering equipment and resulted in downtime due to adverse weather conditions that prevented reconnection of the unit until the following day.

Another factor of reliable operation is that the turbine should experience no significant power degradation. Each month the average power is plotted for each wind-speed bin and analyzed for any obvious trends in power production. Examination of power degradation plots indicated no apparent power degradation for either installed location. The dynamic behavior of the turbine is assessed by observing the turbine in a range of operating conditions. The turbine is observed at wind-speed intervals from cut-in wind speed to a maximum experienced wind speed of 53 mph at the Hampshire install site. Tower vibrations, noise, yaw behavior, and tail movement all were periodically documented for evaluations and consideration in reporting the above data.

For the San Marcos install site the following dynamic observations were made. During high winds, the frame will yaw out of the wind between approximately 5 degrees and 30 degrees which was identified as a result of wind blade wash hitting the integrated frame fin assembly. This constant yaw at higher wind speeds allowed the unit to both maintain a lower overall consistent RPM but also prevented the motor from excessive heating. Additionally, it appears that no excessive vibrations are occurring during these conditions. In winds of between 3mph and 15mph both turbines tracked the wind well with no adverse dynamic behavior observations made. No audible noise was detected from either turbine during any of the testing observations.

## Power Performance Testing

Power performance testing is conducted per IEC standard 61400-12-1, Power Performance Measurements of Electricity Producing Wind Turbines, referencing Annex H for small wind turbines when appropriate. Products of the test include a measured power curve, a power coefficient (CP) curve, and an estimation of annual energy production (AEP). For small turbines, statistical data is collected in 1-minute sets and sorted into 0.5-m/s-wide wind speed bins. Data collection is complete when the wind speed bins between 1 m/s and 14 m/s contain 10 minutes of data each, and the total database consists of at least 60 relevant hours. Wind speed bins are plotted against the corresponding bin power to produce a power curve. Power curves are normalized to sea-level air density; the site-specific air density at the either observed location is relatively low, 1.0 kg/m<sup>3</sup>. The power coefficient is the ratio of power generated by the turbine to the power available in the wind. The power curve for the both turbines show power measurements that are greater than rated power. Preliminary power and CP curves for the San Marcos Install as displayed in Figure 3; Both turbines performed as expected.

The original testing voltage equipment on the San Marcos Install was optimized for power performance and was found un-reliable after several months of operation. After the failure, a production model testing solution, Hobo Equipment, was installed and operated until testing was completed with a backup data recorder on the inverter. The preliminary power and CP curves for both configurations are shown in Figure 4.

Sea-Level Air Density Normalized Power Curve  
SolAir San Marcos CA

m/s	Mph	Bin Wind Speed m/s	Bin Power kW	Number Data Points	C <sub>p</sub>
1.6	3.5	1.554	0	0	0.77
2.1	4.6	2.0424	0.01	1340	0.58
2.6	5.8	2.5752	0.12	1134	0.44
3.1	6.9	3.0636	0.14	903	0.37
3.6	8.1	3.5964	0.41	747	0.30
4.1	9.2	4.0848	0.67	476	0.25
4.6	10.4	4.6176	0.79	276	0.22
5.1	11.5	5.106	0.84	161	0.20
5.7	12.7	5.6388	0.99	65	0.18
6.2	13.8	6.1272	1.17	47	0.16
6.7	15	6.66	1.35	29	0.15
7.2	16.1	7.1484	1.42	15	0.14
7.7	17.3	7.6812	1.56	13	0.13
8.2	18.4	8.1696	1.61	12	0.12
8.8	19.6	8.7024	1.6	8	0.12

Figure 3. Preliminary power and CP data for San Marcos CA Install

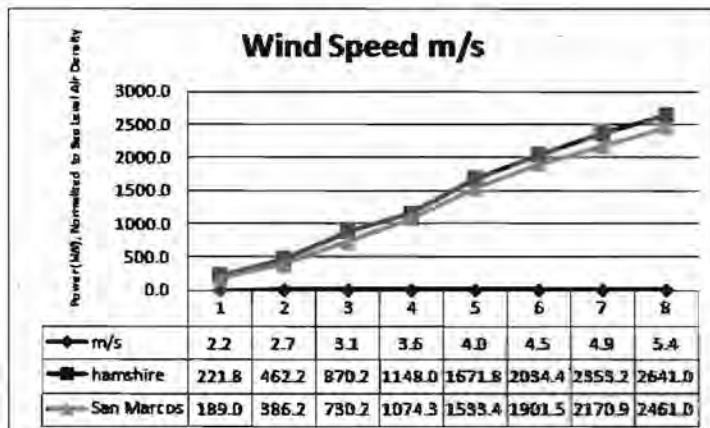


Figure 4. Annual Energy Production (AEP) at sea-level density; 1.225 kg/m<sup>3</sup> for normal power production



Figure 4. San Marcos CA Install preliminary power and Cp curves for the power production GinLong inverter (Inverter 1) and the Hampshire IL location shows preliminary testing inverter install (Inverter 2)

Annual energy production is estimated by applying the power curve generated from power performance testing to a Rayleigh distribution. The AEP is given for annual average wind speeds at hub height for 6.6mph to 19mph. The measurements reported below assume no energy production beyond the highest filled bin in the power performance test.

Hub Height Annual Average Wind Speed (Rayleigh) mph - m/s		San Marcos			Hampshire IL		
		AEP Measured	Standard Uncertainty		AEP Measured	Standard Uncertainty	
mph	m/s	kWh	kWh	%	kWh	kWh	%
5	2.2	189.0	117.2	62%	221.8	157.5	71%
6	2.7	386.2	104.3	27%	462.2	152.5	33%
7	3.1	730.2	131.4	18%	870.2	208.9	24%
8	3.6	1074.3	182.6	17%	1148.0	206.6	18%
9	4.0	1533.4	214.7	14%	1671.8	284.2	17%
10	4.5	1901.5	209.2	11%	2034.4	305.2	15%
11	4.9	2170.9	238.8	11%	2353.2	329.4	14%
12	5.4	2461.0	246.1	10%	2641.0	369.7	14%

Table 3. Preliminary Measured AEP for both units

Table 3 shows the preliminary AEP as measured based on power performance data for both locations.

### Safety and Function Testing

Safety and function testing is conducted per IEC Standard 61400-2, section 9.6, and seeks to test the essential functions of the turbine system. However, NREL does not limit testing to the scope of the standard; other features that are not required by the standard also are inspected and tested. For each turbine, NREL collects data to characterize the turbine's power control, rotor-speed control, behavior upon loss of load, normal start-up, normal shutdown, and emergency shutdown. Additionally, NREL 8 performs turbine specific tests to verify the turbine controller's function and predicted behavior. Although safety and function testing examines the essential functions of the turbine, it does not certify whether a turbine is safe to operate.

Table 4 shows the preliminary safety and function data summary for San Marcos SolAir Install. The turbine performed as designed with one exception. When the inverter was shut down manually using the disconnect switch and then was restarted, an over-load error was present on the Inverter. The error had to be reset before the turbine could be started again.

Table 4. Preliminary Safety and Function Test Summary for the San Marcos SolAir Install

Test Method	Comment	Complies with Design
Power control	Turbine controls power output per design	Yes
Rotor speed control	Turbine controls rpm to 2100, per design	Yes
Normal start-up	Turbine starts at indicated cut-in wind speed and above, and below cut-out; over-speed error control operates as indicated	Yes
Normal shutdown	Turbine shuts down normally in winds less than cut-in and greater than cut-out	Yes
Emergency stop	Turbine when positioned out of the wind stops within 2 to 3	Yes

Loss of grid	seconds. Inverter shuts off immediately upon grid loss	Yes
Undervoltage / overvoltage	In an overvoltage simulation the Inverter cuts off immediately	Yes
High wind speed shutdown	Turbine through mechanical rotation corrects in winds greater than 8 m/s to maintain lower rpm.	Yes
Rotor overspeed	Turbine by mechanical design self brakes preventing overspeed.	Yes
Generator overcharge	Inverter shuts down immediately in simulated generator overcharge	Yes
Excessive vibration	No vibration was detected	Yes
Cable twist	Swivel base wiring connection prevents twisting.	Yes

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